AMERICAN VETERINARY REVIEW.

JULY, 1914.

EDITORIAL.

EUROPEAN CHRONICLES.

Paris, May 15, 1914.

TENTH INTERNATIONAL VETERINARY CONGRESS.—The time is slowly approaching when this great event will take place, and when veterinarians from every country in the world, old and new continent, will arrive in London, and by their number show how great the idea of such a congress, by Prof. John Gamgee, was, and the importance such gatherings have had on the progress, the elevation and the standing of our profession.

The several congresses that have already been held have in succession grown larger and more important, and the efforts made by their organizers succeeded in making them, one after the other, and as they returned, events that mark with a brilliant light, the advances that the profession had been making and gave veterinarians of all nations an opportunity to become better acquainted and create between them more friendly and intimate relations.

The meeting in London of this year will no doubt do as well as its predecessors. In fact, if we are well informed, the organizing committee, with the able veterinarian that it has at its head, has prepared a programme where everything that will make the affair a perfect success has been carefully considered.

It was indeed specially necessary that it should be so, as this

year it will not be only veterinarians from every part of Europe who will be in London, but confreres from America are expected to come to attend the meetings, present papers, take active part in the discipline—in other words, will be there to show European veterinarians that Americans are worthy of their ancestors and moving ahead in the great way that is open to them in their professional callings.

The undertakings of Dr. Eichhorn, with his professional visiting tour, will bring to England a number of our confreres who both before and after the London meeting will travel through Europe and see everything of interest that their professional curiosity can have expected. This undertaking of Eichhorn's must be a success. It will be one; and the visit of the American veterinarians will certainly prove one of the greatest evidences of their appreciation of the worth of their calling. *The flag of the Veterinary Profession of America* will fly with honors, we are sure, in London.

For reasons that many of our confreres may understand, I will not be able to be present at the Congress, but nevertheless I will try to keep the readers of the REVIEW well posted as to the work done in London, which no doubt will prove as great and as important as those of the preceding gatherings.

* * *

ON GLANDERS.—In our excellent contemporary, the *Revue Generale de Medecine Vétérinaire*, that Professors Leclainche and Panisset publish, there often appear condensed extracts from articles that our collaborators in New York address to the REVIEW. It is, for instance, that of Drs. Mohler and Eichhorn on the *Immunization Against Glanders* with vaccination with dead bacilli, and also that of Prof. Gill on the *Prophylaxy of Glanders*. In the same number there are two others, relating to the disease, one from Germany and the *Naouk Veterinary Archives*. The first is by Prof. Holterbach and relates to the *Various Methods of Diagnosis with Glanders in General Practice*.

"Latent cases are, it is unanimously acknowledged, the most

difficult to diagnose clinically and also those that contribute most in the propagation of the disease. They are the cases that it is important to make out and not remain satisfied in taking away from the circulation the animals that present open lesions of glanders. To establish a positive opinion on suspicious cases, there are several methods. Holterbach examines them concisely.

1. *Auto-Inoculation.* Operation which consists in making a small intra-cutaneous inoculation of the nasal or ocular discharge of the diseased animal itself. Made on the superior third of the neck, after disinfection and so as to have no hemorrhage; if it is to be applied on several suspect subjects, it must not be forgotten to carefully disinfect the blade of the instrument after each inoculation.

The cutaneous incision rapidly heals without febrile reaction, if the inoculated matter does not contain bacilli of glanders, but in contrary cases from the first to the fifth day there is a thermic reaction of 1.5° and the symptoms of glanders are soon observed. This method gives indication only when the reaction is positive and may be advantageous when malleine is not handy.

2. *The Extirpation of the Submaxillary Lymph Gland.* This method, advocated by some, has for its object to submit the gland to a bacteriologic examination. It is an uncertain method, as it has been proved that in positive cases of glanders the bacilli have not always been found in the glandular tissue.

3. *The Inoculation to Guinea Pigs* made in the classical way gives undeniable results.

4. *The Injection of Malleine* can be made in three different ways, the hypodermic injection, the ophthalmic and the cuti-reaction. According to statistics, the first has given positive results in 89-92 per cent. of the cases, viz.: That in the number of horses destroyed, lesions of glanders were found in 89-92 per cent. of the horses that gave a positive reaction. The second way is still more positive, and out of 32 glandered horses 31 had presented the reaction. The third method, though it has not yet made its proofs in practice, confirms the preceding methods. As to the method of the deviation of the complement and that of the

precipitation, they are methods which belong more to the laboratory than to general practice.

* * *

The second article, by Prof. Grunet, is a contribution to the *study of the reaction of the deviation of the complement.*

The conclusions of the author are: 1. To obtain the hemolytic serum, three injections, at intervals of 5-6 days are sufficient in the peritoneum of a rabbit, of hematies of sheep, to the dose of 1 1/3, 2 or 3 c.c. in suspension in five or six times their volume in physiologic water.

2. Hematies of sheep, carefully washed, may be kept for 7-10 days at the temperature of 2° C., and to serve for the hemolytic reaction.

3. To obtain sterile serum of guinea pig it is better to bleed immediately in the heart with a two globular pipette. It is not necessary to kill the guinea pigs for that, as half of the bled subjects may survive. The quantity of blood thus taken is sufficient for the reaction and the blood is sterile. After 20 minutes of centrifugation, serum can be obtained.

4. Heating bacilli of glanders (culture on gelose) in emulsion in physiologic water at 60° for 4 hours does not kill them.

5. The heating must be kept at least *seven* hours to kill the bacilli.

6. Extract of bacilli of glanders thus made gives the titre of antigen 1 p. 10.

7. Heating the bacilli with antiformine to obtain antigen is not good as the mixing with the hematies becomes colored a *brownish* green.

8. The serum of guinea pigs inoculated with an emulsion of glandered bacilli contains the amboceptor four days after; from that time the reaction of the deviation is positive.

To wash the hematies well, it is necessary to centrifugate them 5 to 7 times for 40 minutes each time in the electric centrifuge.

* * *

NEW METHODS OF DIAGNOSIS.

IN GLANDERS.—The value of malleine in the diagnosis of glanders and the methods advocated for its use are numerous and well known by all. And with all, on account of the possible errors that may follow its verdict and also to increase the chances of certainty, experiments have been made and different methods have found their way in practice.

An Italian veterinarian, Prof. A. Lanfranchi has lately published in *Il Moderno Zooiatro* a new method, which he calls the *Intra palpebro reaction.*

Most practitioners agree that the cutireaction may give erroneous interpretations and that the ophthalmo-reaction itself has failed in a certain number of cases. Lanfranchi has thought to associate the two methods so as to obtain a more certain diagnosis. The operation is simple. A ¼ of c.c. of brute malleine is dissolved in 2.5 of sterile physiologic serum. The lower eyelid is thoroughly disinfected, and the needle of the syringe for the injection is pushed in the connective tissue which separates the skin from the mucous membrane and the injection made.

When operating on horses that have not glanders, there are sometimes phenomenas of reaction, but they are rather limited and temporary, disappearing after 6, 8 or 12 hours.

With horses affected with glanders, the series of manifestations, observed in the cuti and the ophthalmo-reaction, soon develop.

Indeed, as in the sub-cutaneous injection, made in any other region, there is elevation of the temperature (thermic reaction), general symptoms (organic reaction), swelling at the point of injection (local reaction). This swelling however appears early; it is already quite marked after two hours and more severe than in the one observed in horses that have no glanders; it increases in severity between 12 and 24 hours, extends to the upper eyelid, so as to close the palpebral fissure, reaches and even goes far beyond the zygomatic crest of the maxillary. It lasts between 48 and 72 hours.

There are also early phenomenas of reaction in the conjunctiva, which is highly congested, with fully injected blood vessels; from the second hour there is formed in the conjunctival sac and escaping towards the internal angle of the eye a muco-purulent secretion which lasts even after twenty-four hours. In other words, all the phenomena of the ophthalmo-reaction are present.

Prof. Lanfranchi claims that by this method all the diagnostic signs given by the intrapalpebro-reaction represent the collection of those which are obtained with either the cutaneous and the ocular tests both taken separately. The author does not say if he has met with the similar failures.

*

* *

In Tuberculosis.—It was certain that the discovery of Lanfranchi, applicable to glanders, would soon find its way to other diseases, detectable by injections of some of their products. If malleine gives such a result with glanders, can tuberculine give it in tuberculosis? Professor Moussu has experimented in that direction and applied to the diagnosis of tuberculosis the method of Lanfranchi, viz.: The palpebral intradermo tuberculination.

At first the results were not satisfactory. But after various modifications he has succeeded in obtaining in animals suffering with advanced tuberculosis positive reaction, easy to observe and as conclusive as those that Lanfranchi has found with malleine in the diagnosis of glanders.

Continuing his investigations, Moussu says that he is now experimenting to find how the method will work in cases of mild form of tuberculosis, in the latent or experimental form of the disease.

A point however is well established, viz.: That the method gives a positive answer and that is the principal question.

*

* *

The means of diagnosis of tuberculosis by tuberculine are many. In the *Veterinary Record,* a veterinarian, Wm. Scott, proposes another, viz.: The *puncture of the lungs.* "The more

methods the clinician can bring to his assistance, generally speaking, the better is he in a position to eliminate the risk of error, the result being a more accurate diagnosis."

After careful physical examination (auscultation and percussion), the spot where the puncture is to be made being well disinfected, after the hairs are clipped, and a drop of pure lysol applied at the point of puncture. "Five to ten c.c. of sterile broth or water is taken up and the needle of the aspirator then plunged boldly into the lung parenchyma between the ribs, taking care the seat of puncture is as far removed from the posterior border of the rib as possible, to evade injury to the bloodvessels and nerve. The needle having been driven home, the fluid is now steadily injected, and after the lapse of about a minute aspirated." * * * The material thus collecfed is then centrifugalized in fine tapering tubes, stained by carbol fuchsin, etc., * * * in the usual way.

After describing his technic, Mr. Wm. Scott relates one case of a cow which had catarrhal pneumonia and in which tubercle bacilli was found in the collected aspirated fluid. Another had pneumonic symptoms and bacilli were also detected in the aspirated fluid. A steer, a Devon bull, a short-horn cow which had pulmonary manifestations of various nature and in which also the aspirated fluid demonstrated the presence of Koch bacilli.

Mr. Wm. Scott concludes: "Lung puncture is a most valuable aid to the diagnosis of pulmonary tuberculosis." It is a simple, harmless operation if carried out properly. He has punctured the lungs of 12 equines and four bovines without any untoward results. Punctures can be repeated. Nine of them were made in 24 hours in a horse used to make vaccine. In the cases recorded, tuberculosis could only be made out positively by the examination of the aspirated fluid and post mortem confirmed the diagnosis thus made.

*

* *

Larvar Cylicostomosis.—Under that name a new and serious vermiform enteritis of horse has been described some

months ago in Leclainche and Panisset's *Revue Generale* which throws an important light on a new form of intestinal disease probably heretofore overlooked. The authors of the article have observed it on a colt from a breeding establishment where several subjects had already died with the same disease.

Raised in the field and having all the appearances of health, this colt was taken suddenly with very violent colics, which lasted twenty-four hours. After that attack he lost flesh, although eating good, and he gradually lost strength to such extent that once he fell down and was unable to get up alone. After being raised he whinnied, jumped and ate as any other colt.

The mucous membranes were very pale, the conjunctivae slightly swollen, the temperature 37.5°C. The feces were quite well moulded, but contained many oats undigested; the microscopic examination revealed numerous eggs of strongyliae, 20 to 30 on single preparation.

Soon however the appetite became capricious, the four extremities being swollen and the oedema progressively extended upwards to the pit of the axilla and in the groin. The testicles, the sheath, the interior wall of the abdomen being affected the colt looked as one suffering with purpura. After ten days profuse and infectious diarrhea set in and after forty-eight hours the colt died.

The lesions found at the autopsy involved the whole intestine; the mucous membrane, cleaned of the alimentary matters, appeared filled with a multitude of small, dark cysts, varying in size between one-half and two millimeters in diameter. They were all over the membrane and sufficiently close to each other so as to allow 25 to 30 to be counted on a square centimeter. The largest ones were translucid, round or oval in shape, slightly projecting on the membrane and surrounded by a greyish black circle. The product of the scraping of these cysts contained larvae of nematods. The thick and firm intestinal wall had not changed color, only a few ecchymotic spots being noticed.

* * *

Sections of the intestines showed that the cystic formations were located within the mucous membrane in its chorion. On preparations, they are oval or polyhedral in form and surrounded with the adenoid tissue of the membrane. Their envelop is thin and made of packed connective fibres. In the interior, the parasites cut in all directions show the details of their structure and principally numerous pigmentary granulations. *Embryos* are located in the thickness of the adenoid tissue without cystic formation. There are even some that have passed through the muscular coat and reached the submucous. This is slightly sclerosed and infiltrated with leucocysts. The blood vessels themselves are affected with the chronic inflammation resulting form the irritation caused by the parasites or their toxines.

Besides all these, there were in the lumen of the intestines numerous adult worms, *cylicostomas,* and near them larvae, identical to those of the thickness of the mucous. The worms then reach the intestines as free embryos, probably through impure waters of damp pastures or marshy lands. These embryos enter the intestinal mucous, develop, give rise to the formation of cysts which finally open in the intestines where the parasites become perfect *cylocostomas.* Males and females meet in the intestines, these last lay eggs which are thrown out by feces, the development of embryos follows and the series of infection returned by their introduction in the intestinal canal of other colts.

This new vermiform enteritis is a severe affection for which the prophylaxy indication is rather vague, viz.: The drainage of too moist and marshy lands with the free use of sulphates in the fields.

*

* *

CANINE LEISHMANIOSIS.—At the *Society of Pathologie Exotique* there was recently a communication made upon that disease which is for most scientific men the sure cause of that terrible affection known as Mediterranean Kala-azar.

The disease as observed in human beings, has been the object of researches, which have proved that it is inoculable to dogs

and that it is very frequently observed in them in their natural state. Sir Leishman, who was one of the first to discover the protozoar cause of the disease, has noticed that when infantile leishmaniosis appears the same condition is also existing in surrounding dogs.

The manifestations of the disease in dogs may not be commonly known, but their perfect knowledge is of importance and will justify the small space that I give it here to-day.

The different characters can be resumed as follows:

In relation to the mode of contagion, it seemed proved that the natural infection of the dog is by fleas. Experiments have shown it. The fleas of man, Pulex irritans, and those of dogs, P. serraticeps, are the means of infection with children principally. Mosquitoes, bed bugs and principally the Cimex lectutarius are dangerous propagators.

Canine leishmaniosis is often altent, no morbid symptom is apparent, the appetite is good, there is no loss of condition—even in the cadavers of dogs, dead with the disease, no lesions can be found and the discovery of the parasites in the spleen and marrow of bones is sometimes very difficult.

But besides the latent forms, there are others where the infection is manifested in a more severe manner. At first there are febrile accesses, the anhemia is not very marked and for months perhaps this stage of the disease remains until the last, when death is close, when weakness of the hind quarters and complete paralysis will follow. Nephritis is a common complication. The disease is slow to run its course, and death, which is rather rare, occurs only on an average after 8 or 9 months.

At the autopsy made of dogs that have died, the spleen is often found the seat of lesions quite characteristic. It is generally hypertrophied in the stage of acme of the disease and in serious cases it is only small and fibrous in consistency when the animal is about recovering.

The marrow of bone is most often red and diffluent. The liver has a normal aspect. The kidneys perhaps nephritic. Thoracic organs generally healthy.

It is in the marrow bone and in the spleen that the parasites, *Leishmanias,* are found in greatest number, and again in the liver and lymphatic glands. These parasites are endocellular, are in great number in the mononuclear leucocytes, the endothelial and the hepatic cells. One single leucocyte can contain as many as 60 to 80 *Leishmanias.*

The parasites of natural infections in dogs have the classical aspect of that of Donovani and of the infantile Leishmaniosis, they all cultivate and grow in the same condition. It is of a rounded, often an oval, form, and is constituted by a thin, transparent enveloping membrane, containing an homogenous and clear protoplasm and two chromatic bodies. There is a nucleus and a centrosome.

The diagnosis of the disease is difficult and only laboratory methods will permit of a positive one. The prognosis does not seem serious. Recovery is generally the end of the trouble. A first attack is said to give the dog complete immunity.

No special form of treatment has been recommended. One rapid recovery is said to have followed the administration of Salvarsan.

*

* *

Bibliographic Items.—*Veterinary Notes.* (Parke, Davis & Co.) for March, 1914. *Second Annual Report* of the Commissioner of Animal Industry, Fred. Freeland Walker, Massachusetts, for the year ending Nov., 1913. *Agricultural Journal* of the Union of South Africa, February, 1914. *The Protection of Domestic Animals,* by Prof. V. A. Moore. *The U. S. Government Meat Inspection,* by the same. *Topics of Interest* in the control of animal diseases, by the same. *The N. Y. State Veterinary College* at Cornell University, by the same. *Atlas der Anatomie der Pferdes,* by Doct. Reinhold Schmaltz, Professor at the Veterinary High School of Berlin. (This excellent work will be reviewed later). *Pathologie Interne* of *Cadeac Encyclopedia.* 2d Edition. Nutrition, Auto-Intoxication, Urinary Apparatus, Skin. (To be reviewed later). A. L.

THE FEDERAL ANTI-NARCOTIC LAW.

On page 488 of this issue we have called to the attention of the veterinarians of New York State, the Boylan Bill, which has become a law, operative July 1, 1914. This new law is going to cause veterinarians considerable additional work in dispensing, and we fear considerable annoyance; but it is a law, and we have got to provide ourselves with the necessary blanks and abide by it. But this seems to be but the beginning of the end. The proposed Louisiana Narcotic Law is still more embarrassing to practitioners of medicine, veterinary medicine, or dentistry; and there is also now before the United States Senate the Harrison Anti-Narcotic Bill, known as H. R. 6282, which is not a bad bill in itself, but on June 6 the United States Senate, on the recommendation of Senator Thomas, acting for the Senate Finance Committee, adopted an amendment, which, if passed, would mean to the practising veterinarian, physician or dentist about as follows:

First—The veterinarian, physician or dentist must keep a correct and accurate and detailed record of every single restricted narcotic drug dispensed or given away, to wit, opium or coca leaves or any compound, manufacture, salt, derivative or preparation thereof, *except* in the few instances exempted, *no matter in what proportion or composition or on what occasion so dispensed.*

The country practitioner who dispenses for the most part, riding out by night and day, acting so frequently in emergencies, constantly dispensing, *would bear the brunt of this restriction.* ANY SINGLE SLIP-UP WOULD SUBJECT HIM TO THE FULL PENALTY OF THE LAW, OF A FINE OF NOT MORE THAN $2,000, OR IMPRISONMENT FOR NOT MORE THAN 5 YEARS, OR BOTH.

Second—The government, state and municipal officials will be able *to check up the amounts purchased and the amounts so dispensed.* It will be absolutely impossible in practise for the active dispenser so to dispose of these restricted drugs as to have the purchases and dispensing balance. The result would be that every such active practitioner would be liable to the full penalty

of the law, as above. He would also be put to the constant trouble and worry of endeavoring to keep these records straight and to the constant espionage and explanation by and to all the federal, state and municipal officials.

Third—This record must be made in a suitable book kept for that purpose. This book would have to be constantly with the physician, dentist or veterinarian, in order to record each dispensing, subject to being misplaced or lost, with the result that he would be liable to the full penalty of the law.

And in states where there is already a state law, as in New York State, two books of record would be required to be kept, and the practitioner would be further embarrassed and annoyed. Why not cease dispensing, some may ask (that is probably the object of the bill), but how is that possible with a country practitioner that has to go out miles into the country, away from drug stores? And even city practitioners find it difficult if not impossible to get a prescription compounded after a certain hour of the night. And where they do get it done, often jeopardise the life of their patient while waiting for it. So ceasing to dispense is impracticable, and our only protection is to endeavor to prevent legislation that works the hardship to us, that this amendment to the Federal Narcotic Law would surely accomplish.

New York State practitioners are already facing the difficulties imposed by the law which goes into effect July 1; that is a law and must be obeyed; but we sincerely hope that the amended federal bill does not become a national law, at least until its practicability has been proven in the Empire State. So if it has not passed by the time this number reaches you, get in touch with your senator at once.

EIGHTY-SECOND COMMENCEMENT EXERCISES OF NEW YORK UNIVERSITY.

Ideal weather, excellent music by Shannon's 23d Regiment Band and the Campus at University Heights wearing its richest

shade of green, dotted with groups in University colors, were the auspicies under which the classes of the several schools of New York University received their degrees at the eighty-second anniversary of that grand old institution of learning on June 10th last. It was under those auspicious surroundings, too, that the members of the first class graduated from the New York State Veterinary College at New York University, received their degrees as Doctors of Veterinary Surgery. It was a proud moment for them; but no more so than for the many alumni present from several States. Such an occasion *must* be a proud moment for *all* veterinarians, and for *everyone* who are truly interested in veterinary education; especially on an occasion such as this, when the conferring of veterinary degrees as a part of the commencement exercises of a great institution of learning was witnessed and participated in by the Secretary of War of the United States, Lindley M. Garrison, who received himself the Honorary Degree of Doctor of Laws. Until very recently the War Department has had a rather poor opinion of the veterinary profession, and we feel sure that Secretary Garrison's participation in the recent commencement exercises at New York University will help to enhance the better opinion of our profession that it has more recently entertained. On the same platform a few minutes after the Secretary of War had received the purple, the Chief Executive of Greater New York, Hon. John Purroy Mitchel, also received the Honorary Degree of Doctor of Laws. Mayor Mitchel is deeply interested in educational matters, to which he is devoting considerable of his time. The veterinary alumni had a most excellent dinner in the evening of the same day at the New York Athletic Club.

ON BOARD THE FINLAND.

Responding to the REVIEW's call in its June issue to friends of the sailing party on the official A. V. M. A. tour, under direction of Dr. Eichhorn, to go down to the pier and " see them off,"

a number of veterinarians and ladies went aboard the S. S. Finland in her dock at the foot of West 23d street on Saturday morning, June 10," and spent a pleasant hour before sailing time with their friends who were embarking on the trip. Of the nineteen names published in the June REVIEW, page 275, all were in the Finland's official passenger list and on board—including President Marshall, of the A. V. M. A., and Mrs. Marshall—except Dr. and Mrs. S. Stewart, of Kansas City, who were prevented from carrying out their plans by illness in the family. The sailing party was a merry one, and the massive elegance of the steamer, combined with the ideal weather to make those present to bid them *bon voyage,* regret that they were not going also. It was suggested on leaving the pier that a party from New York and Boston meet the steamer that brings the party (augmented by installments that will follow on later steamers) into the Boston Harbor on August 23d. We trust that the suggestion will become a reality.

HOPEFUL OUTLOOK FOR VETERINARY LEGISLATION.

While neither the Army Veterinary Bill nor the Lobeck-Lewis B. A. I. Bill had reached their final hearing at the time of this writing, the outlook for both bills that mean so much to the American veterinary profession is decidedly hopeful. At our last conference with Chairman Hoskins, of the Committee on Army Legislation, A. V. M. A., he seemed very hopeful of the passage of the Army Veterinary Bill in the 63d Congress; and Secretary Walkley, of the National Association Bureau of Animal Industry Employees, states that an individual interview of the members of the House Senate Committee found them quite favorably disposed toward the measure; and taking all the signs displayed, he feels very much encouraged. Still it is not wise to be too sanguine, but to keep jogging up your representatives on both measures.

ORIGINAL ARTICLES.

THE PRODUCTION OF ARTIFICIAL IMMUNITY AGAINST TUBERCULOSIS IN DOMESTIC ANIMALS.*

By S. H. Gilliland, V.M.D., M.D., Former State Veterinarian of Pennsylvania, Late Director Pennsylvania State Department of Health Laboratories, Marietta, Pa.

(*Continued from June issue.*)

Experiment 115e.

This experiment was started with the object of ascertaining the most efficient and safest dosage, as well as the minimum number of vaccinations required to produce a serviceable degree of immunity against natural infection.

Seven yearling animals were selected for the experiment. Four of them were immunized, each one differently in regard to size and number of doses of vaccine. The three remaining animals were kept under similar conditions as controls. All the animals were carefully tuberculin tested at the beginning of the experiment and found to be free from tuberculosis.

VACCINATIONS.

Animal No. 20012. Red and white heifer, weight 440 pounds—

1903
Sept. 11 Vaccinated in Jugular Vein 20 c.c. Standard Suspension Culture M.

Animal No. 20013. Red heifer, weight 446 pounds—

1903
Aug. 6 Vaccinated in Jugular Vein 2 c.c. Standard Suspension Culture M.
Aug. 19 Vaccinated in Jugular Vein 20 c.c. Standard Suspension Culture M.
Oct. 10 Vaccinated in Jugular Vein 40 c.c. Standard Suspension Culture M.

* Read before the Pennsylvania State Veterinary Medical Association, Philadelphia, March, 1914.

From the Laboratory of the State Livestock Sanitary Board of Pennsylvania.

Animal No. 20015. Red and white heifer, weight 438 pounds—

1903
Aug. 6 Vaccinated in Jugular Vein 20 c.c. Standard Suspension Culture M.
Sept. 2 Vaccinated in Jugular Vein 2 c.c. Standard Suspension Culture M.
Oct. 10 Vaccinated in Jugular Vein 40 c.c. Standard Suspension Culture M.

Animal No. 20016. Red heifer, weight 357 pounds—

1903
Sept. 11 Vaccinated in Jugular Vein 15 c.c. Standard Suspension Culture M.
Oct. 10 Vaccinated in Jugular Vein 25 c.c. Standard Suspension Culture M.

Within ten minutes following the injection on October 10th this animal showed great depression, with pulse over 100 and rapid, labored and painful respirations. Animal died in 45 minutes.

Autopsy revealed an acute extensive edema of the lungs. This animal was replaced by

Animal No. 20018. Roan heifer, weight 372 pounds, and received the following vaccinations—

1903
Oct. 24 Vaccinated in Jugular Vein 15 c.c. Standard Suspension Culture M.
Dec. 7 Vaccinated in Jugular Vein 20 c.c. Standard Suspension Culture M.

Controls—

Animal No. 20014, solid red heifer, weight 405 pounds.
Animal No. 20017, small red heifer, weight 375 pounds.
Animal No. 20026, black and white bull, weight 180 pounds.

These animals, vaccinated and controls, were kept during the period of vaccination and until December 15, 1903, in a stable in connection with the Veterinary Hospital of the University of Pennsylvania, after which date they were taken to the Experimental Farm of the State Livestock Sanitary Board in Delaware County, where they were exposed to natural infection by association with tubercular cows.

It was desired to have the exposure as even as possible, and a stable plan was outlined by which each animal was stanchioned adjacent to a diseased cow. The animals of the experiment were changed weekly from stanchion to stanchion in regular sequence, the tubercular cows remaining in the same stall. We believed this method would give a more even exposure to infection.

RESULTS OF AUTOPSIES, VACCINATED ANIMALS.

Animal No. 20012. Killed May 28, 1906, two and one-half years from date of exposure. Weight, 767 pounds. Tubercular lesions found in posterior mediastinal gland, t t. Bronchial gland, t t; and liver, t t.

Animal No. 20013. Killed January 21, 1906; two years and one month of exposure. Weight, 800 pounds. Tuberculosis of lungs, t t. Bronchial gland, t t. Mediastinal glands, t t t. Post-pharyngeal, t t. Mesenteric glands, t t.

Animal No. 20015. Killed May 28, 1906; two and one-half years of exposure. Weight, 746 pounds. All organs, glands and membranes normal except one mesenteric gland, which contains a suspicious caseo-callous mass ½ inch in diameter. No animal inoculations were made to determine if the same contained living tubercle bacilli.

Animal No. 20018. Killed May 28, 1906; two and one-half years of exposure. Weight, 790 pounds. The right lung contained a mass 1 inch by 2 inches which on section showed considerable fibrous tissue surrounding collections of pus, ¼ of an inch in diameter, which contained tubercle bacilli. On histological examination a peri-bronchial lymphatic node contained a tubercle with beginning caseation and tubercle bacilli. All other organs, glands and membranes normal.

Controls—

Animal No. 20014. Killed September 17, 1904; nine months of exposure. Weight, 610 pounds. This animal was in poor condition. Tuberculosis found in left lung, t t. Right lung, t t t. Pericardium, t t. Left bronchial gland, t t. Mediastinal glands, t t t. Mesenteric glands, t t. The inferior maxillary bone on right side was enlarged and discharging pus through a fistulous tract, evidently actinomycosis. There was apparently a double infection of the right lung—actinomycosis and tuberculosis.

NOTE.—The extent of the disease is indicated by t signs. One t sign means very slightly involved, while six t t t t t t signs means extensive involvement of the organ, gland or tissue named.

Animal No. 20017. Killed May 28, 1906; two and one-half years of exposure. Weight, 782 pounds. Lesions of tuberculosis found in lungs, t t. Mediastinal glands, t t t t. Mesenteric glands, t t t. Liver, t. Post-pharyngeal glands, t t.

Animal No. 20026. Killed May 28, 1906; two and one-half years of exposure. Weight, 840 pounds. Tuberculosis of the lungs, t t. Bronchial glands, t t t t. Mesenteric glands, t t t t. Liver, t t t. Diaphragm, t t.

It will be seen that all of the vaccinated animals contained lesions upon autopsy. Animal No. 20012, which received only one vaccination, had no lesion in the lungs but in the associated lymphatic glands and liver. Was this animal not protected by one vaccination or was the immunity thus conferred so weak that it was lost before the two and one-half years of exposure had expired? Animal No. 20013, which received a large initial dose of vaccine followed by a small dose, and then a large third dose, was not protected, while animal No. 20015, which received a small initial dose followed by two increasing doses, was protected to a greater degree than any of the others. However, none of the vaccinated animals showed as many or as wide a distribution of lesions as the controls.

Experiment 115f.

This experiment was started with the object in mind of ascertaining whether a greater cell resistance could be obtained by using a vaccine in which the tubercle bacilli were suspended in the glycerine veal broth which contained the toxin liberated by them during their growth on the same. In other words, to produce in an animal, both bacterial immunity and a toxic immunity.

This experiment was not in any way satisfactory and little can be gotten from the results, though it might be well to here record them.

The vaccine was prepared as formerly described except instead of using normal saline solutions for the suspension of the tubercle bacilli, the glycerine veal broth upon which they had been grown for six or more weeks was used as the medium.

After the suspensions were prepared an attempt was made to kill the bacilli by the addition of phenol or by heat.

Seven carefully tuberculin-tested animals were selected for the experiment. Two of them were kept as controls, and the remaining five were treated.

Three of the animals, No. 20020, No. 20022 and No. 20024, were injected seven times intravenously with a toxin broth suspension of standard opacity of culture M. The injections extended over a period from September 5, 1903, to June 30, 1904, and the dose ranged from 5 to 25 cc. In some of the suspensions used for the injections the tubercle bacilli were killed by the addition of phenol, while in others they were killed by heat.

The remaining two animals selected for immunization, No. 20021 and No. 20023, received on September 11, 1903, one injection of a toxin broth suspension of culture M. This culture was of bovine origin and possessed a high degree of virulence for cattle. To the suspension was added 10 per cent. of a 5 per cent. solution of carbolic acid and allowed to stand 36 hours before being injected.

On July 5, 1904, all of the treated animals with their controls, No. 20019 and No. 20025, were exposed to natural infection on the Experimental Farm by association with badly tubercular cows.

Results of Autopsies—

Animal No. 20020. Killed September 19, 1904. Exposure, three months. This animal had been blind for some time. Lungs studded with gray, miliary tubercles. No other lesions found in any part of the body.

Animal No. 20022. Killed November 18, 1905. Exposure, one year four and one-half months. No tuberculosis in any part of the carcass except a small nodule in right lung near anterior border of posterior lobe. Guinea pigs inoculated from same developed generalized tuberculosis.

Animal No. 20024. Killed December 30, 1905. Exposure, one and one-half years. In one mediastinal gland and in one

bronchial gland there were a few caseous foci found 1/8 to 1/4 of an inch in diameter.

Animals Nos. 20021 and 20023 which received one injection of a broth suspension of bovine culture H both died within four weeks following the injection. Autopsy revealed an acute miliary tuberculosis. Evidently the phenol had not killed the tubercle bacilli in the suspension in the time allowed.

Control Animal No. 20019. Killed November 18, 1905. Exposure, one year four and one-half months. Tuberculosis of lungs, t t t t t. Mediastinal glands, t t t t t. Post-pharyngeal glands, t t t t. Mesenteric glands, t t t.

Control Animal No. 20025. Killed January 20, 1906. Exposure, one year six and one-half months. A slight tuberculosis of one lung.

It does not seem possible to draw any conclusions of much value from these results. It seems probable that the toxin in the vaccine may have been a factor in the blindness of animal No. 20024. Was the resistance of this animal lowered by the toxin and it became infected by the vaccine? The exposure to natural infection was only three months.

Experiment 1151.

This experiment was outlined with two objects in view. First, to determine the quantity of vaccine and the number of vaccinations required to produce a serviceable degree of immunity against tuberculosis from natural infection. Second, to determine the length of time this immunity is retained by the animal.

Thirty tuberculin-tested animals were selected for the experiment. Twenty were vaccinated and ten kept as controls.

The twenty animals to be vaccinated were divided into five lots of four animals each, and hereafter known as Lots A, B, C, D, and E.

The animals of Lot A, Nos. 1, 5, 10 and 21, received two

intravenous vaccinations of a standard suspension of culture M, viz.:

1904.

January 6 ..... 5 cc., and twenty days later,
January 26 .....25 cc.

On February 16, 1904, 21 days following last vaccination, these animals were exposed to natural infection by being stabled with badly tubercular cows.

Results of Autopsies, Lot A—

Animal No. 1. Killed December 6, 1904; nine and three-fourths months of exposure. No lesions of tuberculosis could be found.

Animal No. 5. Killed December 30, 1905; one year ten and one-half months of exposure. Tuberculosis found in mediastinal gland, t. Post-pharyngeal gland, t t; and mesenteric glands, t t t.

Animal No. 10. Killed January 2, 1907. Two years ten and one-half months of exposure. One encapsulated nodule ¾ inch in diameter in left lung. Mesenteric glands, t t. Post-pharyngeal gland, t. All the lesions well encapsulated and have the appearance of closed processes.

Animal No. 21. Killed January 1, 1907; two years ten and one-half months of exposure. Tuberculosis found in lungs, t t. Mediastinal glands, t t t. Liver, t t t. Portal gland, t t.

The animals of Lot B, Nos. 4, 6, 8 and 27, received two intravenous vaccinations of a standard suspension of culture M., viz.:

1904.

January 6 ..... 5 cc.
March 6 .....25 cc.

On March 19, 1904, 13 days following last vaccination, these animals were exposed to natural infection the same as Lot A.

Results of Autopsies, Lot B—

Animal No. 4. Killed January 1, 1907; two years ten and one-half months of exposure. Tuberculosis found in lungs, t t. Left bronchial, t. Right post-pharyngeal, t t. Mesenteric, t.

Animal No. 6. Killed December 30, 1905. One year ten and one-half months of exposure. Tuberculosis of lungs, t t t. Bronchial glands, t t t. Mediastinal glands, t t t. Right post-pharyngeal gland, t.

Animal No. 8. Killed January 9, 1907. Two years ten and three-fourths months of exposure. Lungs normal. Tuberculosis found left bronchial gland, t. Mesenteric glands, t t t. Liver, t. All the lesions in this animal were distinctly encapsulated.

Animal No. 27. Killed January 9, 1907. Two years ten and three-fourths months of exposure. One nodule ¾ by ⅜ inch in left lung. One mesenteric gland contains three perfectly dry calcareous nodules. All other organs normal.

The animals of Lot C, Nos. 17, 18, 20 and 25, received three intravenous vaccinations of a standard suspension of culture M as follows:

1904

Jan. 6 Vaccinated in Jugular Vein 5 c.c. Culture M.
Feb. 16 Vaccinated in Jugular Vein 20 c.c. Culture M.
Mar. 19 Vaccinated in Jugular Vein 30 c.c. Culture M.

These animals were exposed shortly after the last vaccination to natural infection by association with badly tubercular cows.

Results of Autopsies, Lot C—

Animal No. 17. Killed January 21, 1906. No lesions of tuberculosis. Normal throughout.

Animal No. 18. Killed December 30, 1905. Normal throughout except small caseo-calcareous focus ¼ inch in diameter in left bronchial gland. Well encapsulated and in latent condition.

Animal No. 20. Killed January 20, 1907. Tuberculosis found in lungs, t. Bronchial glands, t t. Mediastinal gland, t t. Post-pharyngeal gland, t. One mesenteric gland, t. These lesions are very slight, but widely distributed.

Animal No. 25. Killed January 1, 1907. Lesions of Tuberculosis found in lungs, t t t. Liver, t t t. Portal gland, t t t. Mesenteric glands, t t. Omentum, t.

The animals of Lot D, Nos. 13, 14, 23 and 26, received three intravenous vaccinations of a standard suspension of culture M, as follows:

1904
Jan. 6 Vaccinated in Jugular Vein 5 c.c. Culture M.
Mar. 6 Vaccinated in Jugular Vein 30 c.c. Culture M.
May 8 Vaccinated in Jugular Vein 40 c.c. Culture M.

The exposure of these animals to tuberculosis infection started before the vaccinations were completed, though the degree of exposure became more severe shortly following the last vaccination.

Results of Autopsies, Lot D—

Animal No. 13. Killed January 2, 1907. Lungs normal. Tuberculous lesions in mediastinal glands, t t t. Bronchial glands, t t. Mesenteric glands, t t t. Post-pharyngeal glands, t t. All of these lesions are distinctly fibrous.

Animal No. 14. Killed April 24, 1905. No tuberculosis in any part of body. Killed on account of lung abscess due to foreign body from rumen.

Animal No. 23. Killed January 21, 1906. No lesions of tuberculosis of any of the organs, glands or membranes.

Animal No. 26. Killed January 9, 1907. Lungs normal except for some new formed fibrous tissue on pleura covering. Tuberculosis of left bronchial gland, t t. Mediastinal glands, t t. One mesenteric gland, t. Right post-pharyngeal, t t.

The animals of Lot E, Nos. 11, 15, 16 and 28, received ten intravenous vaccinations of a standard suspension of culture M as follows:

1904

Jan. 6 Vaccinated in Jugular Vein 10 c.c. Culture M.
Jan. 26 Vaccinated in Jugular Vein 20 c.c. Culture M.
Feb. 16 Vaccinated in Jugular Vein 20 c.c. Culture M.
Mar. 6 Vaccinated in Jugular Vein 20 c.c. Culture M.
Mar. 19 Vaccinated in Jugular Vein 15 c.c. Culture M.
Apr. 2 Vaccinated in Jugular Vein 20 c.c. Culture M.
Apr. 15 Vaccinated in Jugular Vein 15 c.c. Culture M.
Apr. 26 Vaccinated in Jugular Vein 10 c.c. Culture M.
May 2 Vaccinated in Jugular Vein 20 c.c. Culture M.
May 8 Vaccinated in Jugular Vein 20 c.c. Culture M.

On March 19, 1904, these animals were exposed to moderate degree of natural infection, which become more severe after the vaccinations were completed.

Results of Autopsies, Lot E—

Animal No. 11. Killed July 21, 1906. Lesions of tuberculosis found in lungs, t t. Left bronchial gland, t. Pericardium, t. Costal pleura opposite pericardium, t. Mediastinal glands, t t t. Post-pharyngeal glands, t t. Abscess back of pharynx connecting with same. Several lymphatic glands adjacent to same firm and caseous.

Animal No. 15. Killed January 9, 1907. All organs, glands, etc., apparently normal from microscopic examination. Section from posterior mediastinal gland upon histological examination shows in center of section several giant cell-like bodies. No evidence of caseation or cellular infiltration. Guinea pigs inoculated from emulsion of this gland developed tuberculosis. Guinea pigs inoculated from other organs and glands were normal when killed.

Animal No. 16. Killed September 16, 1904. No evidence of tuberculosis could be found. A few lung worms (strongylus micruris) found in the bronchi.

Animal No. 28. Killed January 9, 1907. No tuberculosis found except in one post-pharyngeal gland, which on section contained a thick fluid not entirely characteristic of tuberculosis. Guinea pigs inoculated from the same developed tuberculosis. Guinea pig inoculations from liver, spleen, kidneys, lung and mediastinal were negative.

The ten control animals, Nos. 2, 3, 7, 9, 12, 19, 22, 24, 29 and 30, were kept under similar conditions as the twenty vaccinated animals. There were two controls for each lot of four vaccinated animals. The controls received the same degree of exposure as the animals that were vaccinated.

RESULTS OF AUTOPSIES ON CONTROLS.

Animal No. 2. Control for Lot A—

Killed November 4, 1904. Length of exposure to infection eight months. General condition bad. Extensive tuberculosis of lungs, bronchial and mediastinal glands. These tissues scored to the extent of t t t t t t, or the highest degree in the scale.

Animal No. 3. Control for Lot A—

Killed January 10, 1907. Length of exposure to infection two years ten and three-fourths months. Animal in poor condition. Tuberculosis of lungs, t t t. Bronchial glands, t t t. Liver, t t. Portal gland, t. One kidney, t. Mesenteric glands, t t. Post-pharyngeal glands, t t t.

Animal No. 7. Control for Lot B—

Died May 7, 1904. Two months following exposure. The autopsy notes of this animal were lost, but the physical condition of the animal prior to death was one of tuberculosis.

Animal No. 9. Control for Lot B—

Killed January 10, 1907. Length of exposure to infection two years ten and three-fourths months. Tubercular lesions found in lungs, t t t t. Bronchial glands, t t t t. Mediastinal glands, t t t t. Mesenteric glands, t t. Post-pharyngeal glands, t t t. Superior cervical lymphatic glands, t t.

Animal No. 12. Control for Lot C—

Died January 14, 1906. Animal had been in poor condition for some time. Tuberculosis found in lungs, t t t t t. Some of

the caseous masses are 10 inches in diameter. Bronchial glands, t t t. Right post-pharyngeal, t t. Portal lymphatic gland, t t. Mediastinal gland, t t t t t.

Animal No. 19. Control for Lot C—

Killed January 10, 1907. Tuberculosis found in lungs, t t. Bronchial glands, t t t. Mediastinal glands, t t. Portal gland, t. Mesenteric gland, t.

Animal No. 22. Killed January 10, 1907—

Tuberculosis found in lungs, t t t t. Some of the diseased masses as large as four inches in diameter. Bronchial glands, t t t. Mediastinal glands, t t t t. Post-pharyngeal glands, t t.

Animal No. 24. Killed January 10, 1907—

Tubercular lesions found in lungs, t t t. Pleura, t t. Left bronchial gland, t. Posterior mediastinal, t.

Animal No. 29. Died March 7, 1906—

Animal had been in poor condition for three months. Coughed badly. Refused grain and had to be assisted to regain feet when down. Extensive generalized tuberculosis of the organs, glands and membranes of thoracic and abdominal cavities. Also post-pharyngeal glands.

Animal No. 30. Killed January 10, 1907—

Tubercular changes found in lungs, t t. Posterior mediastinal gland, t. Mesenteric gland, t. Omentum, t. The disease in this animal was not very extensive.

The exposure of the animals in this experiment to natural infection was as even as possible under the conditions. Each animal was stabled next to a tubercular cow and at certain intervals these animals were changed in regular order, so that every animal came in contact with all the tubercular cows used for infection purposes.

In analyzing the results of this experiment we find:

First—That the controls were more extensively diseased. The lesions were more widely distributed. Three of the controls died within two years from the time the exposure to infection began, showing that the degree of exposure was rather severe. All of the vaccinated animals lived until killed.

Second—Five of the vaccinated animals, Nos. 1, 17, 14, 23 and 16, showed no lesions of tuberculosis whatever. Animal No. 15 showed no macroscopic lesions, but guinea pigs inoculated from congested area in post-pharyngeal gland developed tuberculosis. Three of the animals, Nos. 27, 18 and 28, had very slight lesions, in some instances only ¼ of an inch in diameter.

Third—The lesions in the controls were active and progressive, while those found in the vaccinated animal had the appearance of being latent retrogressive.

Fourth—It is possible that the immunity given the animals in Lots A and B had been lost before they were killed.

Fifth—From the character of the lesions and from later experience the writer believes that the animals in Lots C, D and E were exposed too early, and were at that time more susceptible to infection than normal.

Experiment 115 1.

This experiment was started to ascertain whether a tuberculosis-free herd could be reared from animals a large percentage of which were afflicted with tuberculosis—many of them in the advanced form of the disease. Also to obtain further knowledge upon the best culture of tubercle bacilli for the vaccine, the dosage and number of vaccinations required.

The animals used in this experiment were the calves from the tuberculous cows kept for infection purposes, as well as some calves from the vaccinated and control animals in the foregoing experiments.

The method employed was to vaccinate the calf within three to eight weeks from birth, or as soon as it was strong enough to withstand the initial dose of vaccine. The number of doses of

vaccine given were from two to four and in most cases three doses. The initial dose was 1 cc. or 2½ cc. depending upon the condition, size and age of the calf. Each subsequent dose was increased. No regular plan of increasing the dose was followed. The maximum dose for the last injection was never more than 10 cc.

During the early part of the experiment the calves were not removed from their dams, many of which were excreting tubercle bacilli in their milk. They were also kept in infected stables and allowed to run with tuberculous animals. It was found during the progress of this experiment that the resistance of the calf against tuberculosis during the period of vaccination and for a few weeks thereafter was less than the normal resistance of an animal, and if exposed to infection at the time of vaccination was more liable to contract tuberculosis than the normal controls. The autopsy finding indicated the infection implantation took place more readily, but the disease did not appear to progress as rapidly as in the controls.

There were 22 calves immunized at the time they were allowed to remain with their tuberculous mothers and in infected stables. All of these calves either died or were killed within 2½ years following the last vaccination. At autopsy all of the 22 animals showed lesions of tuberculosis except two.

In the latter part of the experiment the calves were removed from their tuberculous mothers and the infected stables as soon after birth as possible, and kept in a special stable away from infection and fed on milk from tuberculous cows that had been pasteurized or boiled. There were nine calves handled in this manner. They were not vaccinated until they were three to four months old and received three injections of vaccine prepared from culture M. The dosage was increased at each vaccination. After the vaccinations had been completed for some time they were exposed to infection by association with tuberculous cows. These nine animals were killed approximately three years following the vaccinations and all of them were normal in every respect except two, which showed small lesions of tuberculosis—

one in the mesenteric glands and the other in the mediastinal glands. Is it not possible that the immunity in these two animals had been lost during their three years of exposure?

As checks for the above vaccinated calves there were 24 calves kept in a similar manner as controls. A large number of these controls died during the progress of the work and on autopsy were found to be badly diseased—in many cases showing a generalized tuberculosis. In no instance were any of them free from tuberculosis.

In comparing the autopsy results of the vaccinated animals with the controls, there is a marked difference in the extent and distribution of the lesions. In the controls they were more extensive, more widely distributed and distinctly progressive, while in the vaccinated animals they were dry, caseo-calcareous or calcareous and in many instances surrounded by a firm, fibrous capsule.

After carefully analyzing the results of the experiments here recorded, I have arrived at the following conclusions:

Intravenous injections of tubercle bacilli from human sources, non-virulent for cattle, are capable of conferring an immunity in cattle against tuberculosis sufficient to withstand natural infection by association with tubercular cows.

The length of the immunity has not been determined accurately, though it is believed to gradually diminish after 2½ years. It is necessary that the animals, during the period of vaccination, and for at least eight weeks following the last vaccination, be kept in a manner that they are in no way exposed to tubercular infection.

The normal resistance of the animal is apparently lowered during the period of vaccination.

The number of vaccinations and the amount of vaccine administered, has a direct relation to the degree of immunity conferred.

The interval between vaccinations should be of sufficient length to allow the reaction following the previous vaccination to entirely subside.

The results of the experiments lead us to be hopeful that the day may come when animals can be immunized against tuberculosis in common practice.

Until further knowledge is obtained in regard to the destruction or outcome of the living tubercle bacilli constituting the vaccine, no practical method for the immunization of animals under ordinary conditions can be advocated.

REFERENCES.

To Dr. Leonard Pearson much credit is due for the original plans of these experiments, and only through his untiring efforts were means obtained from the Legislature by which it was possible to pursue this important line of investigation. Difficulties arose in the progress of this work that seemed insurmountable, and through the wise counsel, kindly suggestions, and encouraging words of this one man the parties in direct charge of the work were stimulated to exert their best efforts.

The writer is deeply conscious of the fact that these experiments could have been presented in a more concise, a more intelligent and a more able manner by the one whose untimely death was a severe blow to the entire veterinary profession. These investigations were originally planned and started by Dr. Leonard Pearson and the writer, who later secured the assistance of a number of men, and to these men I desire to express my thanks:

To Dr. M. P. Ravenel for the isolation of most of the cultures used in the preparation of the vaccine.

To Dr. C. Y. White and Dr. John Reichel for the histological examinations.

To Dr. E. S. Deubler and Dr. John Reichel for the preparation of the vaccine for the latter experiments and general bacteriological work.

To Dr. E. S. Deubler credit is due for many of the autopsies, the vaccinations of the animals and the supervision and management of the Experimental Farm following 1907.

For general assistance during various phases of this work we are indebted to Dr. H. C. Campbell, Dr E. P. Althouse, Dr. E. Barnett and Dr. I. B. Powell.

MORE AMERICAN VETERINARIANS TO THE CONGRESS IN LONDON.—As stated in our June issue, Dr. Ackerman, of the New York City Board of Health, will sail on the S. S. St. Paul of the American Line; and Dr. John F. DeVine, as the official representative at the Congress of the New York State Department of Agriculture, will accompany him. Dr. S. Brenton, Detroit, will sail on the S. S. Minneapolis of the Atlantic Transport Line July 25th, reaching London in time for the opening of the Congress. It is altogether probable that others will join Dr. Brenton in the direct trip to London.

GROWS BETTER AND BETTER EVERY YEAR.—Dr. L. A. Patrick, Snohomish, Washington, says in renewing his subscription: "Inclosed please find check for renewal of the REVIEW. I cannot afford to miss a single copy. The REVIEW is keeping up with the steady advancement of the profession and grows better and better every year."

SOME MECHANICAL FACTORS IN DIGESTION.

By Septimus Sisson, S.B., V.S., Professor of Comparative Anatomy, Ohio State University.

The digestive phenomena which are usually included under the above head comprise: 1, The reception of food and water; 2, the reduction of coarse food and its mixture with saliva; 3, swallowing and rumination; 4, the action of the stomach and intestine in moving their contents.

It is evident that anything approaching a full discussion of all of these topics would be not only impossible, but quite undesirable in a short paper designed for the consideration of readers who are presupposed to be conversant with the main facts regarding these phenomena. The attempt will be made here to deal with some factors concerning which conflicting views have been held or about which opinions still differ. Improved methods of physiological and anatomical study have rendered dubious, if not actually untenable, certain statements relative to the mechanics of digestion.

The mechanism of prehension may be determined without difficulty by direct observation of the process in the various domestic animals, and the functional differences in the various species may be correlated easily for the most part with the corresponding structural peculiarities. The taking in of fluids by drinking, suction, or lapping is also largely open to observation and not difficult to understand, although the muscular actions involved in sucking are somewhat complex.

In mastication the muscular actions are still more complex, especially in herbivora. In the ox, for example, the mandible is moved transversely, longitudinally and vertically, and is also rotated about a dorso-ventral axis passing through the temporo-mandibular articulation; furthermore combined movements occur. In addition there are movements of the cheeks and tongue, and changes of shape of the latter. The lips play a very small

part in mastication in animals with long narrow mouths, such as the horse and ox. In typical carnivora the process is reduced to its simplest terms and consists almost exclusively of depression and elevation of the lower jaw, sufficient to reduce the food to pieces of such size as to be swallowed. An exception to this general statement must be made, however. It is noticeable that in dealing with bones, the process is not at all so perfunctory; dogs chew bones pretty thoroughly, crushing them between their broad-crowned, tuberculate molars.

Two points in regard to the process of deglutition have been the subject of considerable controversy. One of these is the mechanism by which the passage of ingesta into the larynx is prevented. The apparent difficulty in this respect is aggravated in the case of the horse by the great length of the soft palate and the fact that the posterior pillars of the latter unite in arciform fashion over the aditus oesophagi. The following appears to be the most rational explanation of the process, and is in conformity with such direct observations as have been made. The soft palate is shortened and is raised so as to close the posterior nares. The pharynx is shortened and its oral end is dilated. The root of the tongue and the larynx are approximated, so the epiglottis is in intimate contact with the former. The vocal cords and the arytenoid cartilages are adducted so that the rima glottidis is closed, thus preventing aspiration of ingesta into the larynx. In addition the apical parts of the arytenoid cartilages are drawn forward and ventrally, bringing them close to the basal part of the epiglottis, so that these cartilages and the aryepiglottic folds close the vestibule of the larynx. The bolus is projected or "shot," so to speak, through the pharynx, principally by an energetic contraction of the mylo-hyoidei. This is followed by a so-called "clearing up" phase, in which remnants which may remain are removed by the constrictors of the pharynx.

A remark may properly be made here with regard to a practical implication. A very important part of the swallowing process is the apposition of the root of the tongue and the epi-

glottis, which is followed by the return of the larynx to its resting position. It is evident that undue elevation of the head in medication per os in the horse for example is highly objectionable, since it stretches the muscles concerned in these reciprocal movements of the tongue, hyoid bone and larynx, and thus vitiates or inhibits the proper action of this rather complex mechanism. Fortunately the drench has not at all the vogue now which it had formerly in veterinary practice. In those cases in which this mode of medication still seems to be desirable or permissible, care should always be taken to determine whether the patient is capable of swallowing. If the muscular actions which are necessary for the safe transport of material through the pharynx are weakened or not properly co-ordinated, it is evident that more or less of any matter introduced into the mouth is likely to enter the larynx, and the practitioner should govern himself accordingly.

The second point concerning which differences of opinion exist is the mechanism by which alimentary matter traverses the oesophagus. It is evident that three factors would be involved in the process. These are: 1, The force exerted; 2, the physical character of the material swallowed; 3, the nature of the oesophagus in respect to length, calibre and structure.

It has been a common custom, in the absence of experimental evidence and observation, to explain many physiological processes on an anatomical basis. Thus the process of deglutition was divided into three parts, namely, 1, the action of the muscles of the mouth and tongue; 2, the transport of the material through the pharynx by the contraction of the pharyngeal constrictors, and 3, the passage through the oesophagus by peristalsis. In 1880 Falk and Kronecker(1) opposed this view of the process, and on the basis of observations of the action of the mouth and pharynx advanced the theory that deglutition is accomplished essentially by the contraction of the muscles of the mouth, and that oesophageal peristalsis is of minor importance. They believed that the pressure developed in the mouth was sufficient to force food through the oesophagus without peristalsis

of that tube. Kronecker and Meltzer(2) obtained confirmatory results by the use of rubber balloons, connected by tubes with recording drums. One balloon was placed in the pharynx and the other a varying distance along the lumen of the oesophagus. When water was swallowed, the increased pressure on the balloon in the pharynx was transmitted at once to the recording drum and almost immediately afterward the drum connected with the balloon in the oesophagus registered an increase of pressure. By these and other methods Kronecker and Meltzer concluded that liquids and semi-solids are squirted from the mouth to the stomach without the aid of the pharyngeal muscles or oesophageal peristalsis. Meltzer(3) has since shown that, after removal of the muscular coat of the cervical part of the oesophagus, a dog can drink milk and water in a normal manner even when the bowl is placed on the floor. These observers regarded the peristaltic wave which succeeded the principal act of deglutition as a sort of "clearing up" phase by which fragments that might remain were carried to the stomach. Later observations by means of the stethoscope led Meltzer(4) to decide that the movement of the food was checked a short distance from the cardia and that it was propelled into the stomach by the succeeding peristaltic wave some six or seven seconds later.

The possible sources of error inherent in the technique of the preceding and similar investigations led Cannon and Moser(5) to undertake observations on the movements of food in the oesophagus by means of the X-rays. This method excludes possible sources of error which may result from anaesthesia, operative interference, the presence of foreign objects in the tract, etc. It was desired, in addition to testing the results of Kronecker and Meltzer, which these observers explicitly stated held good only for liquids and semi-solids, to determine also the mode and rate of progression in the normal oesophagus of different animals of substances of various consistencies. Incorporation of subnitrate of bismuth with the liquids and solids used gave the necessary shadows for observations. Cannon's observations confirmed those of Kronecker and Meltzer with regard to the

swallowing of fluids in man. He found that "at each swallow the liquid was projected rapidly through the pharynx and well down into the thoracic oesophagus before it was lost to view." In fourteen normal persons Hertz(6) observed that fluid was "shot rapidly down the greater part of the oesophagus," and was then forced slowly into the stomach. The entire process occupied four to eight seconds, about half of which was required for the passage through the cardia. Cannon(7) found that in the dog liquids were "squirted for some distance along the oesophageal tube." Sometimes this rapid projection extended as far as the heart, and at other times only to the thoracic inlet. Further progress was slower but regular. In the cat fluid was projected in a similar way as far as the midheart region; here there ensued a pause varying from a few seconds to a minute or more, after which the contraction of the oesophagus slowly forced the liquid into the stomach.

Accurate physiological data with respect to the mechanism in the other domesicated animals are not available, but ordinary observation tends to support the view that the process is similar in them. It is evident that in the horse and ox liquid is squirted from the mouth a considerable distance along the oesophagus.

There appears to be a close correlation between the mode of deglutition and the histological structure of the oesophagus. Thus in the goose, the oesophagus of which has a muscular coat composed exclusively of unstriped muscle, fluid is swallowed by slow oesophageal peristalsis without propulsive action of the mouth. When the head is raised, fluid trickles into the oesophagus, and is transported by peristalsis, the rate being about the same as for solid food (Cannon, Coc. cit.). It appears that in mammals, when the mylo-hyoidei are paralyzed, the process of deglutition is similar to that of birds. In man the oral third of the oesophageal musculature is striped, the aboral third is unstriped, and the intermediate part presents a gradual transition from one to the other type. This corresponds with the slow contraction of the lower part of the tube as previously noted. A similar correlation exists in the cat as noted above. In the

dog, on the other hand, with an oesophageal musculature that is striped throughout, no lessening of speed was noted in the aboral part of the tube. If this correlation holds good the inference may be drawn that in the ox no diminution of speed would occur in the aboral part of the tube, while in the horse there would be a decided slowing of the rate of transmission from the base of the heart backward, and in the pig the retardation would occur near the cardia.

Solids and semi-solids are swallowed in a very different manner from fluids, except in the case of birds. Solid food is always carried along the oesophagus by peristalsis. Cannon (loc. cit.) observed in the dog that " the solid bolus was quickly discharged into the oesophagus, and descended rapidly for a few centimeters, sometimes nearly to the base of the neck; yet no pause was observed—the bolus simply moved more slowly." In the cat there was a decided retardation beyond the region of the heart; the bolus required three-fifths of the deglutition period to pass through the remainder—less than a third—of the oesophagus. The deglutition period in the dog averages about four or five seconds and that of the cat is about ten to twelve seconds. Hertz (loc. cit.) found that in man solids move slowly in the oesophagus; the period for well-lubricated boluses varied from eight to eighteen seconds, while a dry bolus may remain above the cardia many minutes. This shows the striking influence on deglutition of the physical condition of the bolus in this respect, and throws some light on the occurrence of oesophageal obstruction in horses which attempt to " bolt " imperfectly insalivated masses of dry food, such as chopped hay, chaff, etc. A well-masticated bolus passes along the cervical part of the oesophagus of the horse at a rate of about 35 to 40 centimeters per second—about one-fifth of the speed of liquids; it is probable that the rate is much slower from the base of the heart backward, but the writer has been unable to find any authentic observations in regard to this matter in the available literature. Semi-solids of the consistence of mush seem to be swallowed in much the same manner as solids, the rate of progress of the former being only slightly more rapid than the latter.

As an index to the force exerted by the oesophageal musculature it may be stated that Mosso found that dogs swallowed wooden balls which were loaded by means of a string and pulley with a weight of 250-450 grammes.

It is well known that control of ingesta ceases immediately when the material leaves the mouth; beyond this the action is entirely reflex and involuntary. The entire dependence of the swallowing reflex on afferent impulses from areas of the mouth and pharynx was shown by Wassilieff(8). A small sponge saturated with cocaine solution was swallowed and withdrawn by means of a thread attached to it. For some minutes he was unable to swallow, and saliva, which was secreted in large amount, had to be expectorated. The necessity of an adequate stimulus is clearly shown by attempting to swallow several times in close succession; as soon as the saliva has been cleared out of the mouth, the act of deglutition cannot be initiated, and becomes possible again only when saliva has accumulated or other material is introduced into the mouth. The most sensitive areas or "chief spots" from which afferent impulses arise to stimulate the swallowing reflex have been found by Kahn(9) to be in the course of the natural path of food from the mouth to the oesophagus. Accessory areas exist away from the direct path in places into which particles of food may accidentally be misplaced. In the dog and cat the chief spot is on the dorsal wall of the pharynx near the origin of the oesophagus; here the mucous membrane is innervated by the glosso-pharyngeus. Accessory spots are present on the pharyngeal surface of the soft palate, innervated by the glosso-pharyngeal and maxillary nerves; others are on the pharyngeal surface and base of the epiglottis, supplied by the anterior laryngeal nerve. The swallowing centre is in the floor of the fourth ventricle in front of the respiratory centre. The efferent fibres are chiefly in the mandibular, glosso-pharyngeal and vagus nerves; the last-named innervates the entire oesophagus. Cannon(10) found that in the cat the immediate result of section of the vagi was oesophageal paralysis, but that there was a secondary recovery in the part of the tube that

has an unstriped muscle coat. This phenomenon may be explained on the basis of the myenteric reflex, which is similar to that of the stomach and intestine, and is competent, when adequately stimulated to mediate peristalsis after loss of extrinsic innervation.

In discussing the mechanical action of the stomach consideration will be given first to the simple organ, such as that of the dog and man. The old idea of the churning up of the contents of the stomach was abandoned years ago, and our present conception of the gastric mechanism is very largely derived from the valuable contributions of Cannon,(11) who utilized the X-rays in his studies; the following statements are largely derived from Cannon's descriptions of his observations. This observer divides the stomach on a functional basis into two parts, cardiac and pyloric, between which is the incisura angularis—usually termed the lesser curvature. The fundus of the human stomach is defined as that part of the cardiac division which lies above a horizontal plane through the cardia. The pyloric part may be divided into the pyloric vestibule and the pyloric canal, the latter being about three centimeters in length. Cunningham suggested the terms "cardiac sac" and "gastric tube" to designate functional divisions of the stomach; this connotes the view that the former is a reservoir which gradually "feeds" ingesta to the tubular part as the latter discharges its contents into the intestine. When or shortly after food enters the stomach, peristaltic waves begin about the middle of the body of the viscus and move toward the pylorus; peristalsis begins at once when food enters the empty stomach, provided the latter is in a state of tonic contraction at the time. In the part toward the cardiac end or saccus caecus there is usually a mere tonic contraction. Thus the stomach assumes a tubular form with a pouch-like left extremity, as shown by Cannon's figures. The left extremity then begins to squeeze its contents into the tubular part. But it must not be assumed that the latter is merely or even chiefly expulsive in function. It has the important action of mixing the gastric juice with the food. This action is not due to antiperistalsis, but is

caused by ingesta being moved against the closed pylorus or a contraction ring and thus forced back. Thus the contents of the pyloric part are carried back and forth, and different portions are brought into contact with various areas of the mucous membrane. The ingesta in the left part may remain practically in statu quo for a considerable time, subject to relatively small pressure. The stratification has been observed to persist in the left end more than an hour, whereas it had disappeared near the pyloric end in ten minutes. The contents of the pyloric part had changed to the consistence of thick soup, while that in the left end had undergone no perceptible change, although of course subject to slow and merely superficial penetration of gastric juice. The discharge of chyme into the intestine is regulated by the pylorus which is the "keeper of the gate." The sphincter pylori is closed when food enters the stomach; it relaxes at irregular intervals and chyme spurts through the pylorus a distance of several centimeters into the intestine. Then it closes for a time and recurring gastric peristaltic waves sweep ingesta toward it; the contents are thus carried to and fro in the pyloric vestibule as before stated until the pylorus again opens. The most plausible explanation of the opening and closing of the pylorus is the theory of the acid control of the pylorus. This theory is that food of a certain degree of acidity coming in contact with the pylorus causes relaxation of the sphincter, and that the latter contracts when the acid chyme reaches the intestine. Bayless and Starling(12) have shown that the acid in the intestine stimulates the flow of pancreatic juice, so that the chyme is neutralized soon after leaving the stomach; thus the stimulus which caused closure of the pylorus ceases or is reduced, and the acid in the stomach is again able to cause relaxation of the sphincter. Much evidence has been adduced to support this theory. Addition of bicarbonate of soda to carbohydrate food delays the passage of the latter into the intestine; this is apparently due to the fact Na HCO_3 checks secretion of gastric juice and neutralizes its acidity. Conversely acid protein food is discharged much more rapidly than natural protein, although the manometer does

not indicate any increased intragastric pressure forcing the pylorus open. Inhibiting acidity causes retention of food in spite of strong peristalsis. Serdjukow found that discharge from the stomach could be inhibited indefinitely by repeated introduction of small quantities of acid solution or gastric juice through a duodenal fistula. Corroborative results have been obtained by Tobler(13) and Lang.(14)

The stomach has remarkable ability to adapt itself to varying amount of contents with little or no change of intragastric pressure. Thus Kelling(15) found in the dog the intragastric pressure (ca. 7-7.6 cm. of water) to be practically the same when the stomach contained 460 c.c. of material as with a content of 240 c.c.

The period of retention of food in the stomach and the rate of gastric discharge are affected by various factors, but limitation of space will permit only brief reference to this topic. The influence of chemical composition is shown by Cannon's observations on the cat. He found that carbohydrates began to emerge in about ten minutes, that the discharge was rapid and was usually complete in about three hours. Little or no protein left in the first half hour and the discharge was slow for an hour or more thereafter. Fat was slow in beginning to leave the stomach, the discharge was slow, some even remained after seven hours. Fatty food inhibits or at least does not stimulate gastric secretion and causes slow and weak peristalsis. Another important factor is the physical character of the ingesta. Water begins to enter the intestine as soon as it reaches the stomach; it may pass out in intermittent gushes or continuously. Cohnheim(16) found that water swallowed by the dog when the stomach was full passed along the lesser curvature, diluting only the contents of the vestibule, and pours through the pylorus. Further reference will be made to this in the consideration of the gastric mechanism, since it has certain important practical implications. With regard to consistency of ingesta it appears that this factor does not materially affect gastric discharge of carbohydrates. In the case of protein food dilution tends to cause more rapid

discharge; this is apparently due to reduction in the amount of material which unites with the acid of the gastric juice. Cohnheim (loc. cit.) found that in the dog a feed of 50 g. of finely chopped meat left the stomach in about an hour and a half, the discharge beginning in about 15 min., while the same amount fed in large lumps took almost an hour longer. Furthermore, the "easily digested," finely divided meat emerged largely in unbroken particles, while the lumps were almost entirely dissolved. This would seem to indicate that it is unwise to feed finely chopped meat unless the sole object is to "save the stomach work"—an end which evidently can be attained only by placing more work on the intestine. Variations of temperature of food do not, in healthy subjects, appear to affect materially for any considerable period, either gastric peristalsis or rate of discharge. Cannon and Murphy(17) found that high intestinal section and suture did not interfere with gastric peristalsis, but for almost six hours after recovery from anaesthesia the pylorus remained tightly closed—an excellent example of organic defence. It is evident that gas in the stomach may interfere with the movement of the ingesta and with discharge, even when gastric peristalsis is normal. The amount and position of the gas would be important factors. In the horse a moderate amount of gas (which accumulates in the saccus caecus) would have no material effect. In the ox the amount of gas in the rumen is normally kept within proper limits by eructation.

The mechanical action of the stomach of the horse is no doubt essentially similar to that of the dog, but it is evident that the profound differences in the character of the food, the manner of eating, and the structure and relative size of the organ would have their physiological corollaries. It is regretable that means have not yet been devised to make direct observations of these phenomena in the larger animals, such as have thrown so much light on them in man and small animals. Much information has been obtained, however, by somewhat less direct means, such as feeding experiments, and in this regard we are indebted chiefly to Ellenberger and to others who have worked in his laboratory.

A large part of the investigations of these workers deals with the chemical phenomena of digestion—a topic which is outside the purview of this paper. But observations have also been made concerning the arrangement of food in the stomach, the movement of ingesta in that organ, and the effect of drinking on the gastric contents and on gastric digestion. The methodology of these investigations naturally cannot be detailed in a short paper, but an attempt will be made to indicate the more important conclusions which were reached, and those who desire to go into the matter further will find in the appended bibliography references to most of the literature.

Previous to the epoch-making work of Ellenberger and Hofmeister(18) the current views of the digestive processes in man were regarded as holding good in such herbivora as the horse and ox, and the erroneous notion of the "churning" action of the stomach and consequent mixing of its contents was taught as occurring in the horse.

In the case of horses which are fed in the ordinary way the stomach is never empty and consequently has no "resting state" as is the case in man and the dog. Since gastric digestion is continually in progress it is reasonable to assume that movement of the gastric contents is also practically continuous, although doubtless the degree of activity would augment periodically in correlation with the times of feeding. It is interesting to note in this connection that the wall of the left sac is specially rich in elastic fibres, a structural arrangement which would enable the stomach readily to adapt itself to varying amounts of ingesta, and would also favor movement of the contents of the left sac toward the pyloric part. Since digestion is continuous, the question would naturally arise whether there is almost continuous passage of ingesta through the pylorus. So far as the writer is aware there are no experimental data on which an answer to the question could be based. It may be stated, however, that in dissecting-room subjects (hardened by intravascular injection of formation solution) the pylorus is not usually closed; the size of the opening varies, but is usually sufficiently large to allow the finger

to be passed through it. This fact is very significant, since sphincters in general are firmly contracted in such subjects. It would appear that Cannon's theory of the acid control of the pylorus would not apply perfectly to herbivora with relatively small stomach. It is known that in the horse part of an ordinary feed of hay and oats passes directly into the intestine during ingestion, and when any considerable amount of water is drunk most of it passes through the pylorus at once or in a few minutes.

The observations of Ellenberger(19) and Goldschmidt(20) showed that in the horse a stratification of the ingesta occurred in the stomach and persisted for hours during digestion. This was determined by withholding food from the subject until it could fairly be assumed that the stomach was empty or nearly so. Foods of different kinds were then fed in succession, *e. g.*, first hay, then oats, etc. The animals were killed at varying intervals after feeding and the stomach carefully removed and its contents examined. It is found that the food first taken passes into the most ventral part of the stomach, viz., the fundus gland region or body of the stomach. Succeeding masses formed layers on their predecessors, or piled up on, or settled into or around them, according to the physical character of each. It is self-evident that such stratification and segregation could not occur with finely divided semi-solids or liquids, such as bran-mash, gruel, etc. These results were corroborated and additional facts obtained by more recent observations of Scheunert(21) and Scheunert and Schattke.(22) who used in their experiments horses which were fed and watered in the manner usual in the German army. In order to obtain more precise results they adopted the ingenious method of differential staining of various parts of the rations. The animals were killed at different periods after feeding or watering. The stomach was at once carefully removed and frozen in conformity with the method introduced by Grützner(23). It was then sectioned frontally and its wall removed from the contents. In order to distinguish the remnant of previous feeds the animal was given water colored with malachite green in the morning previous to feeding. In this way

the contents of the stomach were colored sufficiently to be distinguished from food given later. It is to be noted, however, that the penetration of water into the stomach contents varies inversely with the amount of the latter and is also affected by the physical condition of the ingesta. (This point will be taken up again later, since it has important practical implications.) Following the watering the subject was given 750 gm. of oats and chopped hay colored red, followed by 350 gm. of the same colored yellow. It was then given 750 gm. of hay and was killed half an hour after the latter had been consumed. It was found that the remnant of previous feeds occupied about a third of the stomach and lay almost exclusively along the greater curvature in the pyloric and fundus gland regions. Upon this the red-stained food was spread in a thin layer largely in the left sac of the stomach, and upon this in turn the yellow food had been deposited. The hay was arranged somewhat differently, as might be expected from the difference in consistence between it and the ingesta which it followed. The latter was much softer and more watery, so that the hay forced some of the old contents along the lesser curvature to the pylorus. There was, however, no admixture of the various foods and the stratification was easily made out.

The amount of ingesta in the stomach previous to the morning feed appears to be subject to much individual variation and would be affected also by the character of the diet. Scheunert found that it may be a little more than 7 kg. This was observed in experimental subjects which were fed a ration of 1,500 gm. of oats and 200 gm. of chopped hay, which, together with the saliva mixed with it was estimated (on data derived from previous investigations) to weigh about 6.5 kg. The period of deprivation of food which must elapse before the stomach is empty is evidently quite variable. F. Smith(24) states that he found hay in the stomach fifteen and eighteen hours after being given, and on the other hand, under identical experimental conditions, found the stomach empty at the fifteenth hour. The writer has frequently observed in dissecting-room subjects which

have received no food for eight or ten hours that the stomach appeared to be about one-third full. In such cases the food is in the most ventral part of the stomach; the saccus caecus is contracted and contains a small amount of gas. In some cases there is a distinct constriction which corresponds in a general way with the demarcation between the non-glandular and glandular parts of the mucous membrane.

LITERATURE.

1. Falk & Kronecker, Archiv f. Physiologie, 1880, p. 296.
2. Kronecker & Meltzer, Archiv f. Physiologie, 1880, p. 446.
3. Meltzer, Proc. Soc. Exper. Biol. M., 1907, IV., p. 41.
4. Meltzer, Centralblatt f. d. Med. Wissensch., 1883, p. 1.
5. Cannon & Moser, Am. Jour. of Physiol, 1898, I., pp. 435-444.
6. Hertz, Brit. Med. Journ., 1908, I., p. 131.
7. Cannon & Moser, Am. Journ. Physiol., 1898, I., p. 440.
8. Wassilieff, Ztsch. f. Biol., 1888, XXIV., pp. 39, 40.
9. Kahn, Archiv f. Physiol., 1902, Suppl., p. 386.
10. Cannon, The Mechanical Factors of Digestion, p. 28.
11. Canon, Am. Jour. Physiol., 1898, I., p. 362.
12. Bayliss & Starling, Centralbl. f. Physiol., 1901, XV., p. 682.
13. Tobler, Ztschr. f. Physiol. Chemie, 1905, XLV., p. 197.
14. Lang, Biochem. Ztschr., 1906, II., p. 240.
15. Kelling, Ztschr. f. Biol., 1903, XLIV., p. 234.
16. Cohnheim, Munch. Med. Woch., 1907, LIV., p. 2582.
17. Cannon & Murphy, Annals of Surgery, 1906, XLIII., p. 531.
18. Ellenberger u. Hofmeister, Archiv fur Wissensch. u. Prakt. Tierheilkunde, 1880-1886, Bd. VII.-XII.
19. Ellenberger, Handbuch der Vergleich. Physiol., Bd. I., S. 732.
20. Goldschmidt, H., Die Magenverdauung des Pferdes. Zeitschr. Physiol. Chemie, 1886, Bd. VII., S. 361.
21. Scheunert, A. Zum Mechanismus der Magenverdauung. Pflüger's Archiv, 1906, Bd. CXIV., S. 93.
22. Scheunert, A. und Schattke, A. Ueber den Ablauf der Magenverdauung des Pferdes. Zeitschr. fur Tiermedizin, 1913, Bd. 17, Hefte 5, 6, 7.
23. Grutzner, Ein Beitrag zum Mechanismus der Magenverdauung. Pflüger's Archiv, 1905, Bd. CVI., S. 463.
24. Smith, F. A Manual of Veterinary Physiology, 1912, p. 178.

(*To be concluded in August issue.*)

COLLEGE OF AGRICULTURE UNIVERSITY OF MISSOURI has a session covering the dates from June 29 to July 24, 1914, inclusive, with a series of lectures on subjects relative to agriculture and livestock industry, with prominent lecturers listed from all over the country. We find from New York State a representative on the programme, to lecture the third week in July, on *Immunity and Disease Resistance*—Prof. Veranus A. Moore, New York State Veterinary College, Ithaca.

THE INTERCELLULAR FLUID AND ITS RELATION TO HEALTH AND DISEASE.

By Thomas B. Kenny, M.B., C.M., M.D., New York City.

We recently had the privilege of listening to two interesting papers on the "tissue medium" and the tissue food, respectively. The term "tissue plasma" the author has devised to include both products, the medium being the vehicle for "the food." We prefer to use the term intercellular fluid, because it seems to us to convey to the mind more expressively the relation existing between the cell and the pabulum which surrounds it, and in which it literally moves, lives and has its being. The integrity and the welfare of the cell depend entirely upon the condition of the intercellular fluid or tissue plasma. The physical organism is an aggregation of cells, held together by mutual attraction for a special purpose, and in its ultimate analysis the welfare of the single cell, the unit of life, is that of the whole. To live, to functionate, to reproduce, demand certain essential factors.

(1) The cell must receive nourishment to replace the waste which follows cell metabolism. Ceaselessly it transforms one kind of energy into another as it carries out the mandates of its functions. It takes up energy in one form and elaborates and transforms it into another, and unless the waste be replaced, depletion and exhaustion must ensue.

Cells are many and varied in struction and function and their individual requirements vary with their functions. Brain cells in the frontal lobes which convey impressions from the consciousness will necessarily require somewhat different substances for the performance of their functions than bone, hepatic or renal cells. The medium, therefore, from which they draw their sustenance must be capable of supplying each and every cell with just what it needs. Still more will we realize the importance of

this intercellular fluid or tissue plasma when we learn that it penetrates the minute vascular net works of all cellular elements, that the dendrites of neurons contain a similar fluid, and that the very contractions of the heart muscle or myocardium is due to a special secretion carried to its cellular element by the tissue plasma or intercellular fluid.

(2) The cell needs a vehicle into which it can pour its waste products; if not, it would be poisoned by its own emanations, the products of its metabolism.

(3) The cell must be provided with substances which will enable it to ward off attacks upon its integrity by deleterious products from within and from without. The medium which carries to the cell these defensive requirements is this same intercellular fluid or tissue plasma.

We, therefore, take the liberty of emphasizing what we said in a previous paper that the physician in treating disease faces biological, chemical and physiological problems in reference to this intercellular fluid and its relation to the pathological condition present. If the intercellular fluid be defective in quality or quantity, it will entail impaired function, which, if prolonged, will induce pathological change. Disease in its ultimate analysis has its inception *in impaired function.* So long as the cell is supplied with the materials needed for the proper performance of its function and those substances required for its defense against invasion, disease cannot exist, infection cannot hurt it. This intercellular fluid or tissue plasma, we find therefore, is not only a vehicle for food stuffs many and varied, for tissue waste, but it also is the medium which carries to the cell the many organic substances elaborated by various glands of the body as its armor of defense. If you will permit us we will bring this subject more clearly before you by reviewing briefly a few of the data which the monumental researches of Sajous and others have presented on the internal secretions and their bearing upon immunity. For the purpose we take the liberty of quoting freely from Sajous, Vaughan and others.

In the struggle for existence a constant warfare is being

waged, a ceaseless struggle in which the weaker is crowded out and destroyed. The organism, human and animal, exerts a constant vigilance against infection from without and from within. In regard to infection from within we have but to remember that the absorption of undigested and partially digested proteins from the intestinal tract *can be as noxious as infection from a living virus,* and *that foreign protein matter entering the blood stream and tissues can become injurious to the cells of the body, because every unbroken protein contains a highly poisonous group.* How injurious these may become has been shown by Loncope who induced nephritis in rabbits and dogs by repeated injection of horse-serum and egg-albumin. The immense importance which auto-inoculation and auto-intoxication play in the etiology of disease, and the production of many and varied symptom complexes which have no special designation of identification cannot be too strongly emphasized. Luckily for the organism, evolution has supplied it with a mechanism, the gastro-intestinal digestive apparatus, which protects the cells of the body by digesting the proteins prior to their entering the blood stream. This is accomplished by inducing radical structural changes through cleavage. It is a rare condition to find intestinal tracts which are working at par, and consequently our blood stream carries within it almost constantly partially digested proteid matter. To inhibit this self-poisoning, the organism must possess a ready means which will enable it to render nugatory the evil effects. If it were not so, the organism would in a short time be destroyed by the poisons generated within itself. It is this continuous self-poisoning engendered by our habits of life, want of rest, disregard for dietetic and hygienic principles, which makes us so easy a prey for foreign invasion, resulting in impaired function of the cell and its protective apparatus. These problems have induced investigators to search for the means nature employs to protect itself against its many enemies. Metchnikoff was the first to demonstrate that the white cells, or leucocytes, especially the polymorphonuclear forms, have the power of digesting and destroying bacteria. He has shown that they

devour all manner of foreign particles which enter the organism. In fact, the white cells have aptly been called the scavengers of the blood, because they remove any noxious foreign substance which may enter the blood stream or the tissues. A very simple experiment will illustrate the function of the white cell. Examine the web of a frog's leg with the aid of a high-power microscope. The circulation in the finer blood vessels can be followed distinctly and with interest. Meandering slowly along, hugging the walls in preference, will be noticed the white cells, comparatively few in number, gentlemen at leisure, killing time as it were. Take a drop of mustard oil and apply it to the web, and presently tremendous activity will ensue, the blood vessels will dilate and the blood current will become greatly accelerated. It would appear that some agent has now galvanized the white cells into action, for they rapidly increase in number, like soldiers summoned to the fray. Changing their shape, they pass through the walls of the vessels by diapedesis and in a solid phalanx surround that drop of mustard, thus forming a complete protective barrier around the irritated tissue. The products of the inflammation having been effectively dealt with, presently the parts will assume a normal aspect and the leucocytes return to their seeming inactivity. That these phenomena are present in actual pathogenic conditions has been demonstrated clinically in the acute infections, like pneumonia, in which we first find a sthenic stage wherein a pronounced leucocytosis occurs, followed by an asthenic in which the defensive factors become partially paralyzed, and the opposite condition, a hypoleucocytosis, follows. These data are of much practical value from a diagnostic point of view and also therapeutically. Leucocytosis varying from 3,000 to 10,000 will usually indicate in typhoid that perforation is about to occur, and a similar pronounced condition in appendicitis should suggest abscess formation. As we proceed further in our investigations, we find that later researches, especially those of Sir Almroth Wright, have shown that leucocytosis does not always indicate *phagocytosis*. He found that the white cells in the blood of typhoid patients

will sometimes ingest typhoid bacilli but sparingly and at other times with great avidity. Wright was therefore led to believe that there was something present in the blood which was necessary to induce phagocytosis. This substance he christened with the appellation opsonin, "to make palatable." In short, Wright clearly demonstrated that the presence of opsonin was needed to induce the leucocytes to undertake their phagocytic action. Bernard Shaw describes an opsonin aptly as "what you butter the disease germs with to make your white corpuscles eat them." Further researches have shown that if the leucocytes are removed from the blood plasma, that the serum contains within it substances which have an injurious effect upon micro-organism and destroys them. This shows that the blood serum itself has a bactericidal action. But nature has been lavish in her gifts, and a perfect system of protection has been devised to meet every requirement, and we find as we delve into the subject that some diseases, for instance, diphtheria, are overcome by the production in the blood stream of a specific antidote or antitoxin which neutralizes and destroys the effect of the toxins, but which has absolutely no action upon the micro-organisms themselves; in fact, excellent cultures of the diphtheria micro-organism can be obtained when diphtheritic antitoxin serum is used as the culture medium. The defensive factors would seem inadequate, however, if nature did not provide also a means whereby the leucocytes would be assisted in getting rid of the injurious micro-organism, and we find that the blood serum contains certain substances, known as *bacteriolysins,* which have the power of digesting and dissolving bacteria. So far we find the organism is provided with *leucocytes* to consume and devour bacteria and noxious material, *opsonins* to induce the white cells to function properly, *antitoxin* to overcome the toxins generated, *bacteriolysins* to assist the phagocytes in removing the offending micro-organism, and we may be led to believe that every desideratum has been complied with. But we find as we proceed in our investigation that yet another chemical product is poured into the blood stream which has received the name of *agglutins,* possessing the

power of inducing bacteria to clump together, so that they more easily fall a prey to the phagocytes. We find therefore that for every infection the organism is supplied with five special agents, known as antibodies, for combating the condition, and these differ in character with each specific micro-organism and infection. The antibodies required, for instance, for the cure of typhoid fever are useless for diphtheria.

We are healthy when our organism is capable of efficiently inhibiting the constant infection from within and from without to which we are subjected, because of the antibodies which it produces. We become unwell when the antibodies because of some inhibiting factor are ineffectively produced. Immunity consists then of the presence in the blood streams of antibodies which are capable of destroying invading bacteria, and neutralizing toxins generated, be the primary infection from within or from without.

Very interesting as all these facts are, they do not tell us how and where the antibodies are produced. These cannot arise *de novo*, and their presence in the blood stream clearly shows that they have their origin within the body itself, and that somewhere within the organism of man and beast there must exist an apparatus for their production. The work of Sajous and a host of other investigators has shown that it is to the adrenal system we owe our immunity to disease, to toxins chemical and biological. This system consists directly of the pituitary body, the thyroid gland and the adrenals functionally united; the latter, as you know, are also known as the suprarenals and are superimposed one upon each kidney. Indirectly the spleen and pancreas take a minor rôle. Anatomical research has shown that the adrenals have a direct anatomical connection with the anterior portion of the pituitary gland situated at the base of the brain. For convenience we will refer to it for the future as the anterior pituitary body. The connection is through the solar plexus and splanchinic nerves and the cervicothoracic ganglia of the sympathetic. Numberless experiments have demonstrated that the anterior pituitary body is the governing centre of the

adrenals. What then are the functions of the adrenal system? They are vital to the welfare of the organism, because the system

(1) controls *all the oxidation* processes of the body and therefore all metabolic processes;

(2) it protects the body against disease.

The adrenal system actually maintains physical life, because it is the guardian which endeavors to preserve it by increasing its functional activity when poisons or deleterious substances of any kind threaten its welfare. The adrenals control all the oxidation processes, because they secrete a substance which enters the circulation through the suprarenal veins and so becomes intimately mixed with the venous blood in the inferior vena cava. This secretion possesses a very marked affinity for oxygen and as the venous blood is circulating in the capillaries of the alveoli of the lung, it compels it to take up oxygen from the air contained within these alveoli and to discharge its carbon dioxide content. It also endows the hemoglobin molecule with its power to absorb oxygen and to be reconverted into oxyhemoglobin. Furthermore this adrenal secretion is an oxidizing substance which is the main factor *in all the functional processes of the body*. The red cells are mere carriers or "pack mules" laden with oxygen which they serve out to the plasma. It is the plasma which is the real distributing agent and the medium which delivers oxygen directly to the tissues. When the venous blood enters the lung, it contains adrenal secretion, but as it passes out the secretion, because of its affinity for oxygen, becomes changed into a combination in which both substances lose their identity. Before entering the lung the secretion possesses a marked affinity for oxygen, whilst the compound after leaving the lungs, on the other hand, has a marked tendency *to part* with its oxygen when in contact with bodies which have a greater affinity for the gas. This oxidizing substance is not a theoretical conception, for its presence has been demonstrated by Sadkowski, Schmiedeberg, Jaquet, Abelous and others. This oxidizing substance is the underlying factor in all the *oxidation processes of the body*. It has

been aptly described by Sajous this combination of adrenal secretion and oxygen as the "physico-chemical agency through which cellular metabolism is sustained during *passive* functional activity and increased during *active* functional activity." The oxidizing substance, therefore, is a physiological immunizing factor which is constantly functionating, because it acts as a prophylactic agency by converting certain toxins, especially products of metabolism, into benign and eliminable substances by submitting them to an oxidation process. It is a stimulant for all functions of the organism, and furthermore it is an important constituent of antitoxin. By its effects antitoxins submit to oxidation all toxins possessed of sufficient affinity for oxygen. It follows therefore that the adrenals play an important part in the life and welfare of the organism.

We have briefly mentioned the important rôle which leucocytosis and phagocytosis play in assisting the organism to overcome the invasion of bacteria and toxics, and we now propose to briefly inquire into the relation existing between these phenomena and the adrenal system. It has been demonstrated that leucocytosis can be observed after active exercise, massage, following a bath, from the effects of drugs and from the toxins of disease. Researches by Besredka and other investigators have shown that the activity of all "*physiological protective processes and the production of leucocytosis,* etc., *results from over-activity of the adrenal system,* from pathogenic micro-organisms, poisons, foreign substances, drugs, the products of metabolism, if these enter the blood stream in sufficient quantities." Over-activity of the adrenals, therefore, is the inciting factor of leucocytosis, and we may safely assume of phagocytosis and its complement, the production of opsonins, etc., and inversely insufficiency of hypoleucocytosis and an inefficient and poor opsonin content.

We have mentioned that antitoxins are generated in the system, and their special function is that of antagonizing toxins.

Do the researches into the functions of the adrenal system give us any trace as to the formation and composition of these

antitoxins? They have shown that antitoxin consists actually of three substances, trypsin, globulins and adrenal oxidizing substance. The secretions from the spleen and pancreas unite and form a powerful proteolytic ferment which converts trypsinogen into trypsin. Part of the trypsin supplied to the intestinal canal passes into the splenic vein as an internal secretion and thence by the portal vein into the general circulation. Trypsin has the power to destroy toxic albuminoids secreted by bacteria, proteids, toxalbumins, vegetable poisons and venoms. A globulin—fibrinogen—also plays an important part, and by its action all albuminoids are converted into benign products in the blood. The third substance is the adrenal oxidizing compound, which is found in the blood after the adrenal secretion in the venous blood has passed through the lungs, and which we referred to earlier. Trypsin only becomes active when it is combined with certain proportions of fibrinogen and oxidizing substance. The neutrophiles or wandering phagocytes ingest proteid in the intestinal canal; they pass through the villi and mesenteric veins and, reaching the portal vein, absorb trypsin, by means of which they convert proteids into peptones, mysinogen and fibrinogen, all of which are globulins, and distribute these to the tissues, muscles and the blood itself. The combination of globulin proteolytic ferment and the oxidizing substance from the adrenals combine and form antitoxin, which has the power to convert albuminoid poisons or toxins into harmless products. The combination of the three agencies, *trypsin, globulin* and *oxidizing substance, will vary just as the molecular structure of each toxin varies and combine into the proportions needed to neutralize the particular toxin.* The antitoxin for one disease will not serve to neutralize, as you know, the toxins of any other, each inducing the formation of its own specific antitoxin and antibodies. Is it odd, therefore, if vaccine therapy has proved on the whole disappointing? A stock vaccine can be but an inefficient substitute for the actual existing factor in the production of antitoxins or antibodies, etc. Does it not show why an autogenous vaccine will be successful when a similar stock vaccine fails, and it shows the

folly of those shotgun vaccines with a hit or miss object which flood the market? Such a measure is as rational as the shotgun prescription. It also explains the excellent results which follow the proper application of Duncan's autotherapy in acute as well as in chronic diseases, in which the vaccine employed is the unaltered poison generated by the patient himself, administered *secundum artem.* With Duncan's procedure we closely approximate nature's methods. We thus find that the adrenals are necessary agents in the production of antitoxins. What is the function of the thyroid gland in its relation to the adrenal system? *The thyroid sustains the functional activity of the anterior pituitary body by means of its secretion,* which, as you are aware, is iodine in organic combination. Pathological phenomena will follow excessive or deficient production of thyroid secretion, for instance, exophthalmic goitre and myxoedema.

Connected with the adrenals intimately is the posterior or infundibular portion of the pituitary gland, which Berkeley, Howell and other investigators have shown to be the *chief functional centre of the nervous system.* It is also the centre upon which all emotions, shock (be they psychical or traumatic), excitement, depression, react. These stimuli can induce impairment of its functions and the production of pathological phenomena; furthermore the great importance of this portion of the gland will strike you when you remember that it is the *co-centre with the anterior portion in sustaining the cellular metabolism of all organs, because it governs their actual functional activity through the nervous system,* and the anterior portion, as we have previously remarked, ensures oxigenation of the blood through the adrenal system. This function of the posterior pituitary explains interesting data in reference to the psychological factor in disease, which we refer to later. This posterior pituitary, so sensitive to external impressions, is likewise very easily influenced by poisons, drugs, pathogenic agencies, directly or indirectly. Standing sentinel, this guardian of our welfare, insignificant in size, is sensitive to every impression, to every stimulus. Let any invasion from within or from without, no

matter how slight, threaten the welfare of the organism, and it will immediately sense the presence of the invading elements, promptly telegraph orders to the adrenal system, which in turn will respond to its mandates and elaborate those defensive factors upon which the organism, human and animal, depends for its continued existence. The posterior pituitary gland, which has been aptly described as "the somatic brain," is as it were our guardian angel, and Sajous and his co-workers are justified in teaching, therefore, that the pituitary gland is the *governing centre of the vital processes.*

These researches are intensely interesting, but you will naturally inquire, what practical value do they bear to disease, its treatment and cure? We answer that interpreted in the proper light, the relationship is vital, because these researches into the functions of the adrenal system demonstrate that *vital resistance* and its phenomena in general disease are to be ascribed to *fluctuations in the functional activity of the anterior pituitary body, overactively increasing metabolism and the activity of all the functions of the organism, diminished activity reducing the quantity of adrenal secretion served out to the economy and lowering proportionately the activity of all the vital processes.* For instance, overactivity will give rise experimentally to exophthalmic goitre and insufficiency to myxoedema, as we have mentioned previously. The investigations justify the conclusion that the symptoms of Asiatic cholera are induced because of the effects of the *toxins* liberated by the cholera micro-organism upon the anterior pituitary body. Experimentally, insufficiency is found in cholera infantum and other intoxications. Auto-intoxication and its train of symptoms is due, we may be permitted to believe, to the absorption of unchanged proteids into the blood stream, which induce abnormal stimulation of the adrenals or if pronounced insufficiency. It is thought that the convulsions in tetanus are not due to the direct action of the bacterial toxins upon the spinal cord, but to their action upon the adrenals, inducing insufficiency, and consequently excessive accumulation of waste product, the end products of defective oxidation processes. The practical application of this belief we will refer to later.

Does it not also explain the symptoms of anaphylaxis, which really is nothing more than a paralysis of insufficiency of the adrenals. The adrenals have been rendered oversensitive, and a further dose of the remedial agent has been sufficient to paralyze the system. Researches with thyro-iodine have shown that the action of *any poison,* chemical or biological, introduced into the blood stream, depends for its effects upon its action on the anterior pituitary body. It stimulates the gland to overactivity or depresses it and produces inactivity, partial or in whole, and increasing or reducing the secretion from the adrenals and therefore of the oxidizing substance in the plasma. Likewise symptoms of infection or toxaemias are produced; the evidence shows to overactivity or insufficiency of the adrenals. When we come to consider the effect of the remedial measure to be employed in treating disease, the experiments carried out demonstrate *that the physiological action of drugs is due to their action upon the anterior pituitary body.* Digitalis will illustrate the correctness of the data. Clinical researches have demonstrated that seven or eight hours after an injection of digitalis a leucocytosis follows, varying from 20 to 50 per cent. in extent. We have seen that leucocytosis is due to stimulation of the adrenals, and therefore we are logical in assuming that the digitalis leucocytosis is really due to the effect of the drug upon those glands. The value of digitalis in the treatment of infectious diseases at once will strike you. Furthermore it has been found that the adrenal secretion exerts a pronounced stimulating effect upon the heart muscle, increasing powerfully its working power; consequently digitalis by stimulating the adrenals will by increasing the output of adrenal secretion be of much value in increasing and supporting the efficiency of the heart's action in disease. But in this connection it is well to remember that an agent which can stimulate, injudiciously used will overstimulate and induce insufficiency. Iodine, called by Sajous "nature's own remedy," because it is the chief constituent of the thyroid secretion, is of value in secondary syphilis, because it has powerful stimulating effects upon the adrenal system. Is there any drug so valuable,

so universally employed in numberless affections with such good effect? In fact, when in doubt what drug to employ, nine times out of ten the physician will use iodine. Think for a moment of the array of diseases for which it is recommended, from gummata to arteriosclerosis, and you will now admit, perhaps, that the empirical use of this drug has a solid foundation in fact, namely, its pronounced action upon the adrenal system. Mercury experimentally has been found to produce its results, because of its action upon the adrenals, insufficiency following its use if pushed too far, salivation being a primary symptom of the insufficiency. Tuberculin, that two-edged sword, produces its deleterious effect, because it so easily and powerfully induces overactivity and insufficiency of the adrenals. Vaccines, autogenous and stock, and effects obtained by autotherapy, are due to the same stimulation of the adrenals, overdoses producing paralysis or insufficiency. Referring once more to tetanus, bromides and antispasmodics are used to control the dreadful tetanic convulsions, but they really only serve to *depress* further the activity of the adrenals and increase the insufficiency. The very opposite treatment is indicated in the light of these researches. Remedial measures should be employed to reawaken the inhibited adrenal system to renewed activity. The splendid results which have followed the treatment of tetanus by the carbolic acid treatment of Baccelli, when carried out *alone* and *in doses no larger than he recommends,* bear out the contention. His results have been striking and immeasurably superior to any other. Why? Because carbolic acid powerfully stimulates the adrenal system to action and induces such efficient oxidation that prompt oxidation of waste products follow when judiciously employed. In the treatment of malaria this same investigator has produced startling results in the treatment of pernicious malaria by the use of intravenous injections of quinine, because quinine powerfully reawakens the functional activity of the adrenals by its immediate and direct action upon the glands when used by this method, an effect impossible to obtain by oral exhibition. The importance of the investigations dealing with the adrenal system

and its functions may well be illustrated in the treatment of pneumonia. In sthenic stage of this disease we find a full, powerful heart action, leucocytosis, a fever which really is a protective process having for its purpose the conversion of pathogenic elements into waste products by cleavage and oxidation. The adrenals are stimulated actively, and the patient usually runs greater risk from the physician than from the disease, because in his anxiety to do something he is as likely as not to use some drug which will produce overactivity and insufficiency. In this stage of the malady there is nothing so harmful as meddlesome treatment, because it is more than likely to produce insufficiency of the adrenals. In this connection the worse offender is the ignorant and injudicious user of bacterial vaccines; the next, the meddlesome allopath, and the least harmful, the homeopath, because his remedies are not powerful enough to induce insufficiency. In the second or asthenic stage the symptoms give a true picture of adrenal insufficiency, and we must bend all our energies to stimulate the adrenals which are now more or less paralyzed by the toxaemia, and our measures must all have for their aim the use of agents which will reawaken the adrenal system into activity. If you recollect that digitalis produces leucocytosis, because of the hypoleucocytosis which now is present, this drug is indicated, but as it requires 24 to 36 hours to act when used orally we must resort to injection, hypodermic or intravenous. Not only will it induce leucocytosis by its effects on the adrenals, but it will increase the power of the heart by its direct action upon the myocardium. But be careful not to overdo it, because the end will be insufficiency. There are other drugs, such as citrate of caffeine, adrenalin, strychnine, strophanthus, etc., which can be likewise employed with excellent effects when used *secundum artum*. The researches therefore of Sajous, Oliver, Shafer, Sadowski, Jaquet and a host of other investigators have compelled these investigators to conclude that when the proportion of the majority of drugs, toxins, bacterial and chemical, toxalbumins, etc., do not exceed a certain quantity, the adrenal system *is stimulated* to action, but when *excessive* it is *inhibited* or *arrested* and rendered insufficient.

We have, perhaps, exceeded the limit of your patience, and you may well ask what has all this to do with the intercellular fluid or tissue plasma. We reply, everything, *because the efficiency of the adrenal system depends entirely upon the character of the intercellular pabulum or tissue plasma furnishes to these glands.* It is through this fluid or tissue plasma that the cells which comprise the glands are furnished with the materials they need for their nourishment and the materials they use in elaborating the various internal secretions. If the intercellular fluid be poor in quality, the nourishment and materials supplied will be insufficient and lead to insufficient function. Furthermore the toxins, the drugs, etc., reach the cell via the intercellular fluid, and so do the defensive substances, and therefore when we come down to the ultimate analysis, the condition of this fluid is of immense importance to the welfare of the whole organism. Not only must the intercellular fluid be of good quality, but it must be supplied in proper quantity, and this cannot be effected, unless a mean pressure exists, as Beates has suggested, between the arterial system and the venous system. Equally important is the velocity with which the intercellular fluid circulates intercellularly, because it gives up its contents to the cell and takes away its waste products and its end products. It must be normal in rate, not too slow, nor too fast. Thereby to enable the cell to be properly nourished to functionate physiologically, to resist pathological influences and to prevent perverted function, there must exist *circulatory equilibrium.* If that circulatory equilibrium be absent, it must be restored and maintained, and this is an important principle of treatment, not only in nutritional diseases, but in all diseases. We must employ measures which stimulate the heart to increased working power, increasing the force of the heart beats and the propulsion of blood through the blood vessels, and the intercellular fluid in its flow intercellularly.

Our object in presenting this very inefficient presentation of a very important subject has a twofold purpose: first, to illustrate to you in a practical way the importance of this intercel-

lular fluid or tissue plasma; secondly, as a partial reply to Dr. Rogers. We contend that the physician must be both scientific and practical, and by the term "physician" we include every person who by his training is qualified to treat disease. We were impressed at the last meeting by the expressions of opinion in reply to the paper, for they seemed to us in a measure to stultify the importance of your calling and the work you are daily engaged upon. If it be necessary that a physician who intends to devote his life to the treatment of human beings should spend four years, and in some countries five and six years, in medical studies to fit him for practice, surely those who intend to give their services to the care of sick and suffering animal life should require the same standard of efficiency. The human patient assists us in our labors by intelligent description of his symptoms and by his co-operation. We have, as our valuable assistance, the psychological factor, and to show you how important this may be in the treatment of disease, we ask your indulgence to briefly review the latest investigations into shock and its causation.

Crile, of Cleveland, by a remarkable series of experiments in the laboratory on animals, has been able to produce the phenomena of shock experimentally, and he has shown that the animals most liable to shock were those in whom the presence of bodily danger *was capable of producing the phenomena of fear.* He has demonstrated that shock follows injury, traumatic or psychic, in those animals which possess the most highly developed power of associated memory, and that the greatest damage is to be found in the brain cells. Animals exhausted by fright and prolonged physical trauma show changes in the brain cells, ranging from slight alteration to complete deterioration and destruction. The result of his experiments have ocularly proved that psychic stimuli when pronounced can so overstimulate the brain cells that exhaustion follows in ratio to the degree of fear induced. By eliminating the dread of the approaching operative ordeal he has reduced the occurrence of shock to an insignificant factor. This does not comprise the whole of his theory

of kinetic shock and anoci association in the production of surgical shock, but we cannot enter into the other aspects, as they have no direct bearing on our subject. The results of Crile's researches have compelled him to assert emphatically that the mind may cause diseases other than the mental. Emotional conditions are capable of inducing variations in the composition of the secretions of the body, so much so that the activities of the organism can be greatly affected. He asserts with proof that psychic stimuli in the form of emotions *can increase the secretion of the adrenals, of the thyroid and of glycogen, and an increase in the power of the muscles to oxidize glycogen.* These body activities are accompanied by accelerated circulation and increased temperature. Crile goes so far as to show that emotions may so change the composition of saliva as to induce pyorrhea alveolaris. " Chronic emotional stimulation may fatigue or exhaust the brain and may cause cardio-vascular disease, indigestion, Graves' disease, diabetes, insanity." These are Crile's own words, and his conclusions are based on laboratory experiments, and no stronger proof of the importance of the psychic factor and its relation to disease, its cause and treatment, can be advanced. But there is also the positive side of this psychic question, the optimism of the patient, his faith in the remedial measures, his belief in his physician; these play a most important part in the cure of disease.

The veterinarian, however, obtains little aid from the psychic factor, and he has practically to depend entirely upon his own intuition and his training. Can he adequately face the problems which meet him every day, unless he have a good, sound knowledge of both scientific and equally so of practical medicine? A correct knowledge of physiology is necessary for the appreciation of pathology, a correct appreciation of the physiological action of drugs for their proper therapeutic application. A working knowledge of the more precise and scientific methods of clinical diagnosis is a *sine qua non* to the solution of the diagnostic problems which face us all every day. Gentlemen, it is only those of us who have had the opportunity to be familiar with the post

mortem room of a large hospital, and who have had opportunities to compare the diagnosis with the autopsy findings, who can realize what a merciful repository the grave is to the reputations of eminent physicians and surgeons. For seven years the speaker, as a medical officer in his country's service, had among his duties to perform a large number of autopsies; many of these were upon patients of his own, and he assures you that his pride was frequently humbled in the dust, and his self-complacency and esteem became a minus quantity. It is only thus we realize our deficiencies, our limitations and the tremendous responsibilities we assume when we undertake the functions of our office as physicians, and how morally criminal we become when we approach our duties inadequately equipped for the services we offer.

We are all members, you and I, allopath, homeopath, veterinarian, of one great brotherhood, whose mission is the cure of disease, the amelioration of suffering and pain. The day, let us hope, is not so far distant when the sectarian differences will cease to exercise our minds, and the physician will be an "omnopath," ready to employ every remedial measure which will help him in the treatment of his patient, be it man or beast. You may think us visionary, but we refuse the impeachment, because we believe, that your duties, gentlemen, are in a measure as sacred as ours, your responsibilities relatively as great, for every brute beast is one of God's creatures, pawns in the Divine Architect's scheme of evolutionary progress, and their place, no matter how humble and insignificant, is therefore in its measure of much importance in its relation to the welfare of the whole.

BIBLIOGRAPHY.

Sajous (Internal Secretions), Metchnikoff, Berkeley, Porter, Oliver, Schafer, Abelous, Vaughan, Smith, Williams, etc.

PROF. SISSON'S ARTICLE ON SOME MECHANICAL FACTORS IN DIGESTION will be continued in the August issue, beginning with the interesting question of *The Effect of Watering on the Stomach Contents, and the Transport of Water Through the Stomach and Small Intestines.*

OSTEOPOROSIS IN HORSES.*

By A. C. Wight, D.V.M., Pittsburg, Pa.

By osteoporosis is meant a disease of the bone, characterized by a diffuse, rarefying *ostitis*. This disease is encountered sporadically throughout the country, but is especially prevalent in this vicinity (Pittsburg, Pa.). It is becoming of great importance; the loss annually to the team owners from this one condition being conservatively estimated at $10,000. It affects animals of all ages, in all conditions of stabling, and without regard to the feed used.

I will not trouble you with a description of the histology, pathology, etc., but will try to confine myself to the detailing of some clinical observations which will give an idea of the prevalence of the disease, how we run across it, the outcome, possible mode of transmission, and any peculiar incidents which may come to my mind.

As to cause, I agree with those observers who have thought that the causative agent would be found to be a bacterium. My observations have led me to believe that this, and not food, environment, etc., is what will be found to produce this trouble.

In the first place, we find affected only those animals which have been in the city for a period of at least two years. We have never had a case in a horse which had been here a less time. Age has apparently no influence upon the susceptibility, as we find it as much in young animals as in old ones. We have never had a case in a mule.

Secondly, the habitation very evidently has no connection as a possible cause, as reported by some, as we find it alike in first-class private stables, in horses kept in cellars under the worst possible situation, in boarding stables, in the fire department

* Reprinted from the *Veterinary Alumni Quarterly*, Veterinary School, Ohio State University.

and the department of public works, and in fact any and all circumstances.

Thirdly, feed appears to me to have no influence as a direct causative agent, although it may be a factor in the progress and spread of the disease in an animal already infected. Bran has been given as the cause, but I have seen horses affected that had never had bran, at least not for a long time. Horses have developed the trouble when fed on any or all of the common horse feeds that you might care to mention. Some support the argument that feed is the cause by showing that when a horse is taken off that feed and put on some feed as alfalfa and molasses, very often he shows an improvement. I am inclined to the opinion that the improvement noticed is a result of the fact that the new food does not have to be chewed so much as the oats and bran (you know the horse's jaws are very tender and he eats slowly and carefully and does not chew any more than he has to) and is more easily assimilated, and therefore raises the body resistance to the progress of the malady, thereby producing stasis, or partial recovery, instead of supplying any new elements in which the former feed was supposedly lacking.

Fourthly, the water. Here we find a medium which cannot be so easily dismissed as a probable source of the trouble. It is the one thing, exclusive of the air, which all the horses affected with osteoporosis have in common. It is my belief that there is something about the water, either bacterial or else a deficiency in composition, which causes all the trouble. It is known that there is not a large amount of the solids taken up by the body which come from the water ingested, but that the body depends for minerals upon the absorption of complex chemical compounds from the organic foods.

This brings us to bacteria, and the probability of a bacteria being the cause of osteoporosis. Many theories can be advanced to support this statement, and much clinical evidence can be so construed as to point in that direction. In the first place, we have a disease which is very prevalent in some locations and unknown in others. Methods of feeding in this country are very similar

in any of the large cities. The food material comes from all parts of the country to these cities, so that if the food was the cause the disease should be equally common over the country. This is not the case.

Water has not the same mineral content in various parts of the country, but as I have said before, there is little mineral taken up by the body from the water. Many animals have nothing but what is practically distilled water. Still, the water the horses get could easily contain specific bacteria, capable of exciting this disease in susceptible animals.

Stabling conditions are very similar in all cities. In all there are good stables, and others with very bad sanitary conditions. Therefore, as some authors state, the same neglect should bring about osteoporosis, no matter where found.

In this city there are stables from which diseased horses are constantly being removed, and there are others where it is never seen, or has not appeared as yet. Then there are stalls in stables which are constantly yielding their quota of cases, yet other stalls in the the stable appear to be entirely innocuous. For instance, there is one stable from which three horses have been taken in six years, without another case being seen in any other stall (this stall, by the way, is next to the heater), and another stable where four were removed in seven years (this stall is also next to a stove).

A stable of twenty-five head had been losing from three to four horses a year, and others in the stable were seen to be affected. These horses were fed on oats, bran and all the hay they wanted. The stable was clean and well ventilated. Treatment in this case was to remove all horses which showed any signs of being affected, and the thorough disinfection of the building. The feed was changed to cut hay and molasses and alfalfa feed, and no cases have recurred since.

A small Italian boarding stable loses two or three head yearly, notwithstanding the fact that they feed largely alfalfa feed. Another stable across the street is similarly situated.

Symptoms.—The first thing that usually attracts our atten-

tion to the horse is the fact that he has a not easily diagnosed lameness, or one that centers in a complex mechanism, as the stifle or fetlock. This usually responds to treatment accompanied by rest, but in a short time he is lame again in a different part. I am frequently told that a case of lameness has been diagnosed by another veterinarian as rheumatism and treated as such. This treatment cures the supposed rheumatism for a time, as all these cases get all right again for a time if they are rested. But when he is worked again the "rheumatism" recurs. I am firmly convinced that many, in fact I am tempted to say nearly all, of the cases in the horse which are diagnosed as rheumatism are nothing more or less than osteoporosis, mayhap in an occult form, and I would earnestly advise that in *every* such case the possibility of the presence of osteoporosis be remembered and an examination made to exclude that condition.

Another common reminder is that the owner wishes the horse's teeth dressed as he is falling away in flesh, and does not eat rapidly. In some communities the horse's temperature is taken as a precautionary measure, but here we immediately examine for osteoporosis as a matter of routine.

Goneitis is commonly seen in a marked case, and is very often the only thing the matter with the horse that a veterinarian who has not seen cases of this kind can find wrong. I have shown cases to out-of-town veterinarians for examination without giving them a hint as to the condition, and the goneitis was all they could see. Swelling of the face which is supposed to be one of the marked diagnostic features is present in only a small portion of our cases, probably because we usually find the case before it has advanced to that point, which is the beginning of the end.

Prognosis.—Very advanced cases are hopeless and should be destroyed. If they are able to walk, they should be sold for whatever they will bring, as they are liable to break down at any moment. An advanced case was kept in idleness in the hope of shaping him up a little and then sent to the auction. He broke down in both front feet as he was being led home by his new owner.

A horse which had been standing in the stable, being treated by a veterinarian for a supposed shoulder lameness, was taken out by the owner in a time of emergency. He went about half a mile when he became very lame in the right fore limb. He was returned to the stable, and as he was going up the gangway the sesamoid bones of all four legs gave way. Upon post mortem, they were found to have been crushed as if put on an anvil and hit with a hammer.

The prognosis in horses if in fair condition depends entirely upon the future treatment. I have seen cases that have stayed in the city and have given efficient service over a period of years, others that soon died, and still others that did neither, so I am never sure what one is going to do. One thing is certain, if the diet and care is not changed, or if the horse does not leave town, death will ensue in from three months to a little over a year. I have one horse from an Italian stable that has shown thickening of the face, thickening of the lower jaw, goneitis, etc., for two years, and yet at the present time he is none the worse, and is working every day.

I usually give a favorable prognosis in those cases which can be gotten out of town. Some of those cases never lose a day after they leave the city. For instance, one horse that was in the fire department, and which was condemned because he could not make a run without being lame for weeks afterwards, was sold to a dealer at auction. He shipped him to Buffalo, and from there to Boston, where he was put into the fire department, and at last accounts was still giving good service and apparently sound. Another horse went twelve miles into the country to a pumping station, worked there two years, and was returned to the city. The disease which had been, as one might say, hibernating, at once returned and death ensued in three months. The common story is, though, that horses showing the first stages of the disease can be sent out of the city and expected to give good service, and become free from the trouble, although the swelling will not entirely disappear.

The *course* is anywhere from three months to a year and

a half from the time that the diagnosis is first made till the case either breaks down or has to be destroyed because of the impaired physical condition.

Treatment.—This consists in all cases which are not removed from the city in the feeding of alfalfa feed and molasses, and alfalfa hay, and the disinfection of the stall. As I previously stated, I do not think that this gives the horse any elements that he lacked before, but merely relieves the tax on the digestive organs, and raises the resistance. This has given very good results in a multitude of cases, and is to be recommended in all cases where removal is not possible. We had one case where a horse was removed merely from one stable to another in the city here, with a prompt increase in the physical condition and without any change in the feed at all.

Medicinal treatment seems to have little or no effect although arsenical preparations are sometimes given in the hope that they would help bring about a condition of stasis in the progress of the disease.

Always advise an immediate sale when this trouble is diagnosed.

Summary.—I consider osteoporosis to be a disease of bacterial origin, the spread being through some intermediate agent and not by direct contact. In this city our suspicions are directed towards the water, but no investigations have been made in that direction. Feed and stabling conditions certainly have no influence, and neither one can be, in my opinion, the direct causative agent.

We have never seen a case that has not had at least two years' possible exposure to the infection agent, as evidenced by the fact that all cases had been in the city at least that length of time.

Treatment consists of either endeavoring to raise the general resistance, or to remove the animal to a new habitat.

Most of the veterinary literature I consider to be worthless as to the etiology of this disease, and the treatments as propounded by the various authors are of no avail.

There is here, I think, a great opportunity for a bacteriologist to give us the exact etiology, and from what I can see a vaccine which will allow us to treat osteroporosis in such a manner as to bring about recovery without sacrificing a large per cent. of the monetary value.

ANOTHER HORSEMAN WRITES A BOOK.—Thomas Floyd-Jones has followed the example of Fred Dietz and written a book about old New York, which promises to be of absorbing interest to horsemen, sportsmen and old boys in general. Mr. Floyd-Jones has lived a long lifetime in New York and vicinity, and has known and seen nearly all the great trotters and runners since the days of the Union Course. His ancestors on Long Island owned Mambrino, the son of Messenger and sire of Tredwell's Abdallah, and one of them backed Boston Blue in the match in which 3:00 was first beaten by a trotter in public for a purse, stake or wager, so far as is known. The book is now in press.

A CURTAIN RAISER.

O Horse, I sometimes wonder when I see
  Some roaring chariot urged by gasolene
  (Proud in its hundred horse-power) blur the scene
With speed that never came from pedigree—
Or when some areo-devil rigged to be
  A pest in Lucifer's long-lost demesne,
  I view aloft—ah, then with sorrow keen
I wonder, Horse, what will become of thee!

Thus brooding, to thy Yearly Festival
  I ride (by taxi) and behold thee dear
As when thou borest Valkyrs to Valhal
  Or did still sprightlier jobs for Paul Revere.
Neigh, Horse! fear not the dodo's lonesome fate;
For what we love we never give "the gate"!

(Wallace Irwin, in "*The Smart Set.*")

THREE USEFUL KNOTS AND HOW TO USE THEM.

By Prof. H. E. Kingman, Chair of Surgery, Fort Collins, Colo.

In comparison with human surgery, the literature pertaining strictly to veterinary surgery is almost a minus quantity. It

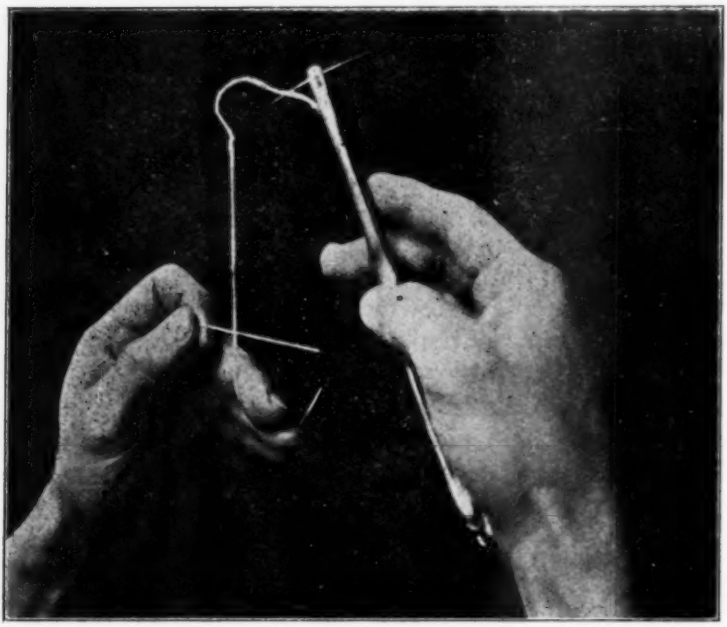


Figure 1.

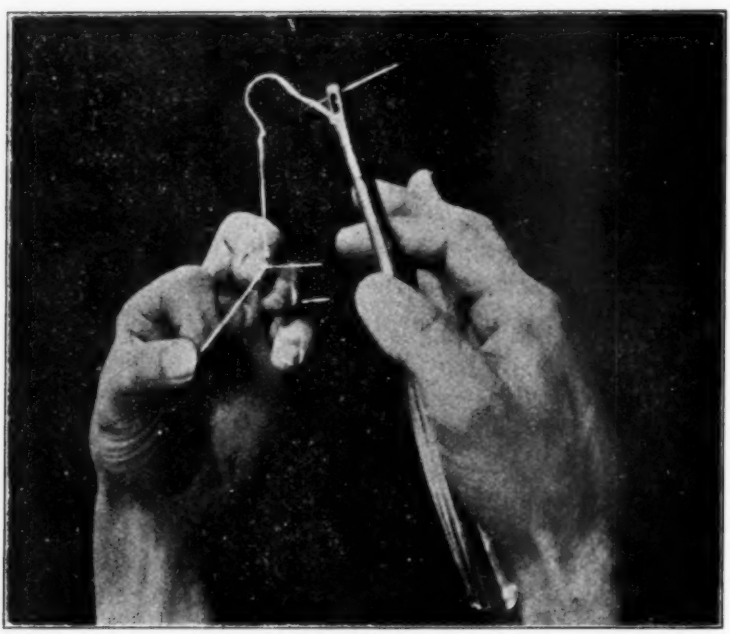


Figure 2.

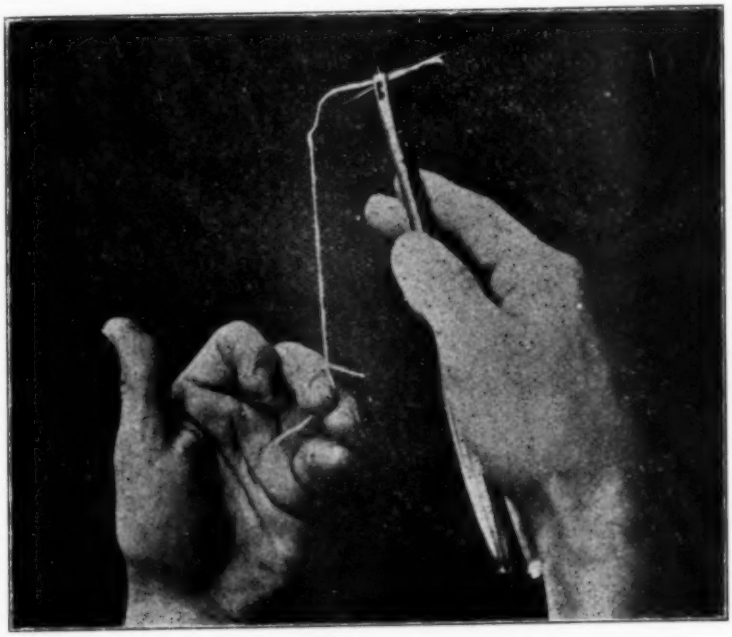


Figure 3.

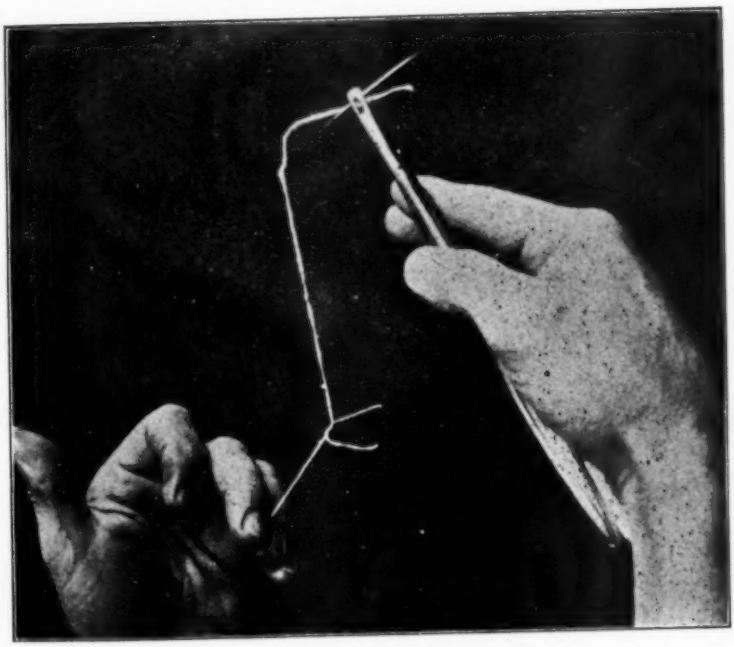


Figure 4.

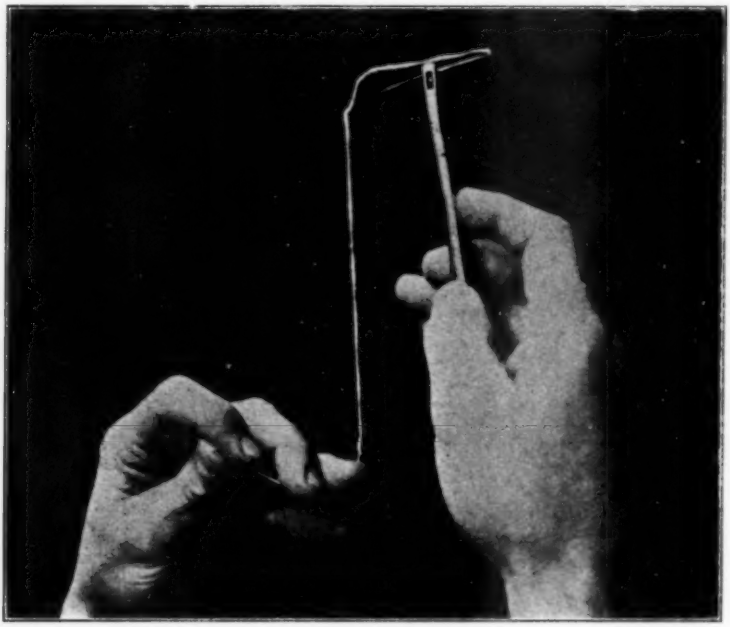


Figure 5.

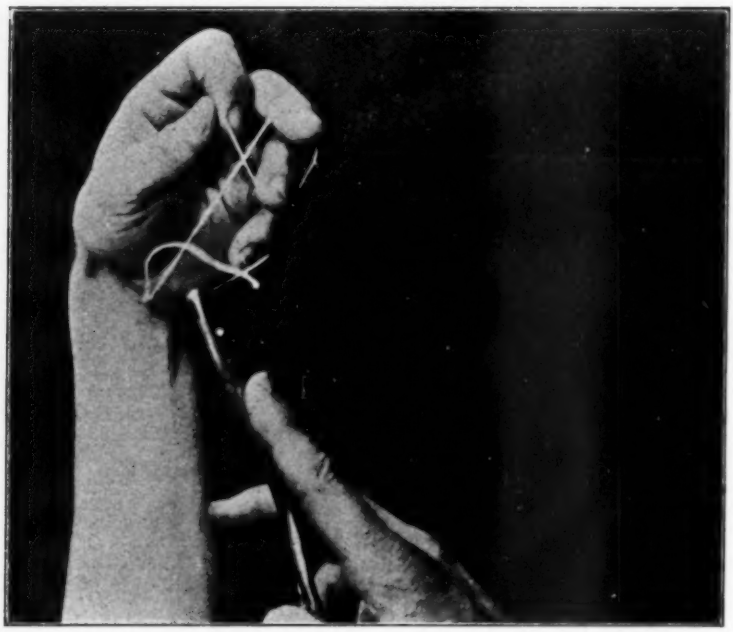


Figure 6.

Figure 7.

Figure 8.

is not meant to overlook the little we have that is of good quality, but the fault lies in the fact that there is not enough of it, and minute detail seems to be neglected. Certainly the tying of a knot is of fundamental importance, since it is a part of nearly every operation and should be one of the first steps in the instruction of operative surgery. An operator's reputation of course, depends largely upon the results he obtains; a surgeon should work with all possible speed and still do his work well; and both speed and efficiency depend largely upon technique, which is made up of a number of consecutive steps. An operation as a whole, then, may be improved by developing the individual parts.

The knot herein described is tied with one hand; it is a very convenient and simple method and when perfected by practice adds a finish to the operator's technique.

Another illustrated article, by Prof. Kingman, entitled "A Bow Line on a Bight," will appear in the August REVIEW.

PRIZES TO MEMBERS OF SENIOR CLASS, NEW YORK STATE COLLEGE AT CORNELL UNIVERSITY, ITHACA.—The following prizes were awarded the senior class at the above institution at the recent commencement exercises. *Horace K. White Prize:* First prize to Alfred Savage; second prize to Jos. Stanley Clark. *The Hollingworth Honorarium in Pathology:* To Alfred Savage. *The Jane Miller Prize in Physiology:* Divided between Harry Peter Bonnikson and Peter Theodore Peterson. *The Laura C. Schroeder Prize in Small Animal Clinic:* Awarded to Floyd Thomas James. *The Joseph Gordon Bennett Prize in Anaesthesia:* Awarded to Ralph Ray Moulthrop.

VETERINARY MEDICAL ASSOCIATION OF NEW JERSEY.—The mid-summer meeting of this association will be held on July 9th at Montclair, N. J. Dr. James McDonough, of that beautiful city of homes, will play the rôle of host. That fact alone insures an excellent meeting, to which President Smith extends an invitation to his many friends in the adjoining States; and when "Tom" Smith extends an invitation you are assured that it is a hearty one. We will venture an opinion on our own account that "Jimmy" McDonough will have every lame horse in Essex County lined up for inspection by his colleagues and friends.

SUMMER HINTS FOR LIVESTOCK.

By L. M. Steckel, D.V.M. (O.S.U.), New York, N. Y.

Now that the summer season is in full swing and the heat pressing heavily on man and beast, it behooves man, of higher intelligence, to take full consideration of his friends "the dumb animals." Remember well that as the horse works in the hot weather and perspires heavily, he needs considerable more water to drink and, therefore, you should not be stingy in this respect. Let him have freely of this commodity and you will not be afraid that he is overfilling himself too much at one time. Of course, it is a good rule not to let a horse drink too much cold water while he is overheated. You should also drive the horse slower in hot weather and when at work in the field give him a rest every now and then, if possible in a shady spot. Do not change the horse's feed suddenly; do that gradually, especially is this true of new hay or new oats. During the days of rest let the horse have exercise and give him a little grain, but not the full ration as when at work. The stable should be kept clean and cool; the windows and doors screened and remember to swat the fly. The harness should be kept clean, especially the collar and saddle. It is very advisable to take the harness off the horse when he has his noon-day meal.

Cows on Pasture.—It is well to remember that in the intense hot days of July and August cows, too, are likely to suffer from the heat. Be sure to provide some shade for them. In case you have no woods, then bring them under the shed during the afternoon. See that the cows have plenty of cold water to drink. Also let them wade in a clean brook whenever they seem inclined to do so. Who has not observed, on a hot summer's day, cows standing belly deep in water in a brook or river?

Another thing, cows are often pestered by flies. To mitigate

this condition spray them several times a week with any of the fly remedies, such as "Shoo-Fly," or crude petroleum mixture, for sale in drug stores. A small spray pump for this purpose can be purchased at a small expense. When you bring the cows into the barn at milking time, do not allow the flies to swarm there. Have the place clean, the windows and doors screened. A cow cannot do both, stand the flies and fill the milk bucket.

What little expense and extra care bestowed on the cows during this time will be amply repaid by results in the pail.

The small stock, too, should not be overlooked. They must not suffer from heat and flies either.

Dr. J. B. Archer Dead.—After our forms were closed, we received a communication from our esteemed friend, Dr. A. F. Nelson, Indianapolis, Ind., containing the details of the death of Dr. J. B. Archer, of Spencer, that state. An obituary notice will appear in our August issue.

Has Reviews From Volume Fifteen and Cherishes Them.—Dr. Lyman D. Brown, Sedalia, Missouri, in requesting two back numbers of the Review, says: "These two numbers will complete my files from Volume XV. to the present time. I have arranged to have them bound that I may better care for them."

Value Greater Than the Cost.—Dr. F. L. May, of Pennsylvania, in renewing his subscription to the Review, writes: "I don't know how you can get out so good a veterinary journal for the money. I can't possibly get along without it."

Has Taken It Twenty-six Years.—Dr. George V. Towne, Connecticut, says in renewing his subscription: "Here goes for an enclosure in the form of a P. O. Money Order for my subscription to the Review, making my 26th year."

PURE BRED STALLIONS.

By L. M. Steckel, D.V.M. (O.S.U.), New York, N. Y.

I wish to impress upon farmers the necessity of mating their mares to pure bred stallions. In every locality there are usually found one or more pure bred stallions of the draft type suitable for service for farm mares. The difference in cost between the scrub stallion and the pure bred sire may appear quite significant; the result, however, will more than compensate for it. So many of the abnormalities, such as badly curbed hocks, congenital ring-bone or faulty conformation noticed in farm horses can be traced direct to the parent stock. The saying that horses are horses must be modified in this regard; namely, that while the animals we call horses may have the characteristics of the horse, still they may not be suitable for the needs of the horseman. There is a distinction between any kind of a horse and a good horse.

It makes no difference whether you breed a horse for farm work or for driving. You should have at least a good sire to start with. It costs just as much to feed the poor scrub horse; in fact, it is a crime to give away good feed to a poor horse. If you breed the right kind of horse and follow this with proper feeding you are bound to develop a good animal—good for yourself and good for somebody else. I wish, however, to impress upon you very strongly that the mere fact that the stallion is pure bred is not sufficient to justify your mating the mare to him. You must know the kind of stock he comes from and the kind of stock that come from him; that is, what kind of foals he produces; in other words, the pure bred stallion should have a record of merit.

REPORTS OF CASES.

A FIFTH SEASON'S REPORT UPON THE PERMANENT VALUE OF THE VENTRICLE STRIPPING OPERATION FOR "ROARING." *

By FREDERICK HOBDAY, F.R.C.V.S., F.R.S.E., Honorary Veterinary Surgeon to His Majesty the King, and formerly Professor in the Royal Veterinary College, London, Kensington, W.

In fulfilment of a promise made to the readers of *The Veterinary Journal* some years ago, I am presenting another year's report upon the value of the ventricle stripping operation, first brought into prominence as a practical measure by Dr. Williams(1), of Cornell University, for "roaring" in horses.

There is no question but that the operation can be said to have attained success in a very large number of cases, a further year's experience being that the proportion stated in *The Veterinary Journal* last year(2) (fully 75 per cent. of hunters and 90 to 95 per cent. of carriage horses) of useless horses made useful, is by no means exaggerated.

Similar favorable reports have now been published or received from various parts of the world, notably in America by Merrilat, Cary, Blatenberg and others; in Italy by Professor Antonini(3); in Germany by Professor Eberlein(4); in France by Professor Cadiot(5) and M. Victor Drouin(6); in Hungary and Austria by Mr. W. Reynolds, M.R.C.V.S.(6), and the operation may truly be said to have become a godsend in its value to both owner and patient in preference to the only other previously known method of relief, viz., the tracheotomy tube.

Even if the operation only gave relief for one season, and the tube had then to be inserted it would be worth doing, for every owner or stud groom who has had experience of the cleansing and general care required by a "tubed" hunter will without hesitation assert that if the evil day *can* be staved off for even only so short a period as one year it is worth while making the attempt; and one very strong point in favor of this operation is

* Reprinted from *Veterinary Journal* (London), April, 1914.

that even if it does not succeed the horse is just as good as he was before for the insertion of the tube.

There have been, in my experience, so far as I have been able to trace up to the present, less than 2 per cent. of relapses, and most of these did one or two season's hunting before it occurred. I write now from the results of 837 individual horses whose respective histories since the operations I have kept in touch with.

The first two horses operated upon in England, which were done by Dr. Williams in September, 1909, are still at work to the satisfaction of their respective owners.

The list given on pp. 168 to 171 is a continuation of the history for another year of 100 cases, the same which were reported upon in *The Veterinary Journal* for January, 1911.

During the past year, on numerous occasions at Tattersall's, Warner Sheppard and Wade (Leicester), and other places, horses which have been operated upon have been entered in the catalogues as "operated upon for wind," and described as "practically cured," thus showing that the vendors are not afraid to admit the fact, and the prices reached have been quite on a *par* with those of average hunters.

I know of no reason at present for altering any opinion expressed in the reports of previous years, and the following brief extracts from letters of owners whose horses are in the above list are still further confirmatory evidence of the permanent value of the results obtained:

Case 8.—February 24, 1914. "The bay horse 'Newsboy' is dead. He broke his leg in the hunting field, going well to the last, although making a noise.

"The grey horse seems to be quite cured, gallops on and does not tire, and makes no perceptible noise; would probably pass a vet."

Case 18.—Owner wrote, February 26, 1914: "The chestnut horse is going much better this season than he did last season. He is in much better condition. He was out hunting to-day with the Enfield Chase Staghounds, and I took particular notice of him; and I must say he went remarkably well. He was well up to the front all the time, which was an hour and fifteen minutes. He has hunted twice this week, and he is hunting again on Saturday.

"The only thing I can see against the horse is that he has a little discharge from the nose, but not so bad as it was last winter. He is a *real good hunter.*"

Case 25.—At first the result was so excellent that, although the horse was a bad roarer prior to operation, both the owner and a well-known hunting veterinary surgeon considered the beast to be "sound in wind," and a certificate was given to that effect. Some months later, however, after galloping about one and a half miles a curious habit of gulping would come on, and if not allowed to slacken speed the animal was threatened with dyspnœa. This would pass off in a few minutes when pulled up, and only reappear after a hard gallop.

As only one side had been done, it was decided to reopen the larynx and strip the right ventricle. This was done on November 23, 1911, and a V-shaped portion of the soft palate excised, as this appeared abnormally relaxed and enlarged. The result was to temporarily benefit the horse, and the animal went back to hunting for some months.

The gulping, however, returned, and after the hunting season the horse was shot (July, 1913).

Case 29.—February 23, 1914: "The gelding 'Challenger' is still hunting and going very well. My son has him at Cambridge."

Case 55.—February 25, 1914: "The 'tubed' horse that you did in 1910 goes splendidly. He makes a slight noise, but it does not stop him at all."

Case 70.—February, 1914: "The owner is pleased to say that the mare operated on four years ago has got no worse since she was done. She still makes a noise when galloping, but it does not seem to distress her."

Case 79.—March 28, 1914. Owner wrote: "The chestnut horse operated on for his wind in May, 1910, makes very little noise except when he is very fresh, or pulls hard in very heavy land. It is a certainty that if the operation had not been performed on him I should never have gone on riding him, as I hate a noisy horse."

Case 81.—March 27, 1914. Owner wrote: "I am pleased to state that my horse you operated upon in May, 1910, is still going well.

"I am not certain that he would pass the vet., but he gallops strong and well and does not roar; he makes a little noise, but it is not perceptible casually, and does not stop him; before he roared at a trot."

Case 89.—February 23, 1914. "I am still of opinion that the operation for roaring is a very great success.

"The brown horse you first of all only did on one side, and the year after completed the other side, is really wonderful. Just when first starting off you can hear him slightly, but afterwards not at all."

Case 97.—March 28, 1914. Owner wrote: "I have much pleasure in informing you that my roan horse which you operated on (I think four years ago) has been going thoroughly strong and sound. He has again carried my huntsman all this season and has put in an exceptionally hard time, doing very often other horses's work, and has not been sick or sorry once. A *most* remarkable success."

Case 108.—March 27, 1914. Owner wrote: "The operation you performed on my bay hunter in 1910 has been most successful. I do not say there is no noise, for I think in that respect the horse is going back; but he is going as strong as ever this season, and his wind does not seem to distress him."

Case 115.—March 27, 1914: "The grey hunter operated on in June, 1910, is going wonderfully well, and 'hops the top twig' twice a week. He makes a little noise, but it does not stop him at all, and is nothing to what it was before operation."—M.R.C.V.S.

Case 116.—March 29, 1914. Owner wrote: "I am glad to be able to tell you that the chestnut hunter you operated on for roaring in June, 1910, is still going on satisfactorily."

Case 117.—February 25, 1914: "The horse of mine on which you operated some four years ago has been hunting all this year; was, in fact, out on Monday last. He makes a noise, and it stops him occasionally, but for Sussex he is as useful a horse as one wants, as the wind affection does not interfere with him in a hunt in that country, though I sometimes notice it on the Downs."

Cases 119 and 120.—On March 27 the veterinary surgeon wrote: "I have spoken to Colonel K——, and he says 'Puggy' is still going well, and that the operation is a great success.

"Lord L——'s horse was sold at Leicester last autumn, and I have lost sight of him, but he was quite all right then."

Case 129.—February 23, 1914: "The mare 'Cinderella' is still carrying me as well as ever, never 'sick or sorry,' and I may fairly repeat and confirm contents of my letter of March 24, 1913."

Cases 137 and 138.—On March 16 the veterinary surgeon wrote: "Colonel M——'s hunter has been sold, and was almost cured. The operation was a success. Captain C——'s horse has

No. case	Date of operation	Class of horse	Age	Description before operation	Result on first trial	Report in January, 1911	Report in April, 1912	Report in April, 1913	Present report (March, 1914)
	1909								
1	Sept. 10	Hunter	10	Bad whistler	Excellent	Excellent	Excellent	Excellent	Excellent.
2	Sept. 10	Hunter	9 or 10	Bad whistler	Excellent	Excellent	Excellent	Excellent	Excellent.
	1910								
5	Jan. 25	Hunter	7	Bad roarer	Much improved	Can gallop freely without distress	Satisfactory	Satisfactory	Unable to trace.
8	Feb. 3	Hunter	10	Bad roarer	Much improved	Can gallop without distress, although makes noise Second operation, Aug. 30	Satisfactory	Excellent	Excellent till destroyed for broken leg.
10	Feb. 15	Hunter	6	Bad roarer	Much improved	Excellent	Excellent	Sold and lost trace of	
11	Feb. 15	Hunter	8	Bad whistler	Excellent	Practically cured, perhaps a little thick in wind	Excellent	Excellent	Sold and lost trace of.
18	April 1	Hunter	7	Roarer	Not very satisfactory	Satisfactory	See notes	Hunting well, but still has nasal discharge	Much better than last year.
20	April 6	Hunter	..	Roarer	Good	Satisfactory	Satisfactory	Satisfactory	Satisfactory.
22	April 6	Hunter	..	Roarer	Excellent	Excellent	Excellent	Excellent	Developed heart trouble. Destroyed.
25	April 10	Hunter	6	Bad roarer	Excellent	Excellent	Satisfactory	Satisfactory	Dead. See note.
29	April 10	Hunter	8	Roarer	Not good	Second operation, Sept. 29. Now satisfactory	Satisfactory	Satisfactory	Satisfactory.
31	April 15	Racer	3	Bad roarer	Slight whistler, but no distress	Slight whistler, but no distress	Satisfactory	Sold; unable to trace	—
40	April 15	Hunter	5	Bad whistler	Excellent	Excellent	Excellent	Excellent	Destroyed for lameness.
41	April 19	Hunter	8	Confirmed roarer	Excellent	Excellent	Excellent Since sold for £100	Makes a noise again, but can hunt without distress	Unable to trace.
44	April 23	Hunter	9	Bad roarer	Excellent	Excellent	Excellent	Excellent	Excellent.
45	April 24	Hunter	5	Bad whistler	Excellent	Excellent	Satisfactory	Satisfactory	Satisfactory until shot after an accident.
51	April 24	Hunter	7	Bad whistler	Excellent	Excellent	Excellent	Sold and lost sight of	—
53	April 27	Hunter	7	Bad whistler	Excellent	Excellent	Excellent	Excellent	Sold and lost sight of.
55	April 27	Hunter	9	Bad roarer	Satisfactory	Satisfactory	Excellent	Excellent	Excellent.
57	April 27	Hunter	7	Bad whistler	Excellent	Excellent	Satisfactory	Relapsed and was shot	—
58	April 30	Hunter	7	Bad roarer	Improved	Satisfactory	Satisfactory	Sold and lost sight of	Unable to trace further.
64	May 4	Hunter	..	Moderate whistler	Excellent	Excellent	Excellent	Sold for £200 and lost sight of	Unable to trace further.

68	May 7	Van gelding	7	Bad roarer	Excellent	Satisfactory	Satisfactory	Still satisfactory	Satisfactory.
70	May 8	Hunter	6	Bad roarer	Excellent	Excellent	Excellent	Excellent	Excellent.
71	May 8	Hunter	6	Bad roarer	Temporarily better	Second operation, Sept. 9. Excellent	Excellent	Excellent	Excellent.
73	May 10	Hunter	16	Bad roarer	Excellent		Excellent	Excellent	Excellent.
79	May 22	Hunter	12	Bad roarer	Not very satisfactory.	Still some noise, but hunting without distress	Satisfactory.	Satisfactory. See notes	Satisfactory.
81	May 23	Hunter	..	Bad roarer	Excellent	Excellent	Excellent	Excellent	Excellent.
85	May 28	Harness horse	9	Bad roarer	Improved	Second operation, August 3. Now excellent	Satisfactory.	Satisfactory	Satisfactory
87	May 30	Hunter	6	Bad roarer	Excellent	Excellent	Excellent	Excellent	Sold and lost sight of.
89	June 1	Hunter	9	Roarer	Excellent	Excellent	Excellent	Excellent	Excellent.
92	June 5	Hunter	9 or 10	Bad whistler	Not very satisfactory.	Now satisfactory	Satisfactory.	Slight relapse, but still hunting	Has been shot.
93	June 5	Hunter	7	Roarer	Satisfactory	Satisfactory	Satisfactory.	Slight relapse	Sold and lost sight of.
96	June 9	Hunter	15	Bad roarer	Satisfactory	Satisfactory	Excellent	Excellent	Excellent.
97	June 10	Hunter	9	Bad roarer	Not satisfactory	Excellent	Excellent	Excellent	Excellent.
98	June 11	Hunter	8	Bad roarer	Satisfactory	Satisfactory	Satisfactory.	Sold and lost sight of.	Unable to trace further.
100	June 12	Russian Orloff trotter	4	Bad roarer	Excellent	Excellent	Excellent	Excellent	Excellent.
101	June 12	Russian trotter.	4	Bad roarer	Excellent	Excellent	Excellent	Has developed very severe stringhalt	Unable to trace further.
105	June 15	Hunter	6	Bad roarer	No improvement	Second operation, Improving	Excellent	Relapsed	Sold and lost sight of.
106	June 15	Hunter	12	Bad roarer	Improved, but still makes noise	Second operation, Sept. 10. Now satisfactory.	Excellent	Satisfactory See notes	Destroyed for injury.
107	June 16	Hunter	7	Bad roarer	Satisfactory	Satisfactory	Satisfactory.	Satisfactory	Developed ringbone and sold.
108	June 16 1910	Hunter	7	Roarer	Excellent	Excellent	Excellent	Excellent	Excellent.
111	June 18	Hunter	10	Bad roarer	Not good (2d operation Oct. 20)	Now satisfactory	Excellent	Excellent	Satisfactory.
113	June 23	Shire	3	Roarer	Improved		Excellent	Has relapsed	Unable to trace further.
115	June 26	Hunter	6	Roarer	Much improved	Satisfactory	Satisfactory.	Satisfactory	Satisfactory.
116	June 27	Hunter	8	Whistler	Excellent	Excellent	Satisfactory.	Satisfactory	Satisfactory.
117	June 27	Hunter	..	Roarer	Satisfactory	Satisfactory	Satisfactory.	Satisfactory	Satisfactory.
118	June 27	Hunter	..	Bad roarer	Satisfactory	Satisfactory	Satisfactory.	Died. See notes	—
119	June 29	Hunter	12	Roarer	Excellent	Excellent	Excellent	Excellent	Excellent.
120	June 29	Hunter	8	Bad roarer	Excellent	Excellent	Excellent	Excellent	Sold and lost sight of.
121	July 1	Polo Pony	7	Bad roarer	Improved	Satisfactory	Excellent	Excellent	Excellent.
122	July 1	Hunter	5	Whistler	Improved	Excellent	Excellent	Excellent	Excellent.
126	July 5	Hunter	8	Bad roarer	Satisfactory	Satisfactory	Satisfactory.	Satisfactory	Sold and lost sight of.

No. of case	Date of operation	Class of horse	Age	Description before operation	Result of first trial	Report in January, 1911	Report in April, 1912	Report in April, 1913	Present report (March, 1914)
127	July 5	Hunter	9	Bad roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Sold and lost sight of.
130	July 8	Hunter	3	Roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Sold and lost sight of. Unable to trace.
131	July 8	Hunter	6	Bad whistler	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory.
134	July 11	Carriage	7	Bad roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory when sold; since lost sight of	—
136	July 14	Hunter	6	Very bad roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory. See notes	Shot for varicular disease.
137	July 15	Hunter	8	Bad whistler	Excellent	Excellent	Excellent	Excellent	Excellent.
138	July 15	Hunter	7	Bad roarer	Excellent	Excellent	Excellent	Sayisfactort	Satisfactory
140	July 21	Hunter	6	Roarer	Excellent	Excellent	Satisfactory	Has been sold and lost sight of	—
141	July 24	Hackney	5	Bad roarer	Excellent	Excellent	Satisfactory	Satisfactory	Satisfactory.
145	July 28	Hunter	4	Bad whistler	Excellent	Excellent	Excellent. Sold since for £120	Excellent. See notes	Excellent.
149	July 28	Racer	5	Bad roarer	Excellent	Excellent	Excellent	Sold and lost sight of	—
151	Aug. 2	Hunter	8	Bad whistler	Excellent	Excellent	Excellent	Excellent. See notes	Excellent.
152	Aug. 2	Hunter	9	Bad roarer	Excellent	Excellent	Excellent	Excellent	Excellent.
153	Aug. 3	Hunter	10	Bad roarer	Excellent	Excellent	Excellent	Excellent	Excellent.
160	Aug. 5	Hunter	6	Slight whistler	Excellent	Excellent	Excellent	Was sold and lost sight of	—
161	Aug. 6	Hunter	9	Roarer	Not good	Improving	Satisfactory	Satisfactory	Satisfactory.
162	Aug. 6	Hunter	7	Bad roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory.
163	Aug. 6	Hunter	6	Bad roarer	Excellent	Excellent	Excellent	Satisfactory	Excellent. See notes.
167	Aug. 9	Carriage	9	Bad roarer	Excellent	Excellent	Satisfactory	Satisfactory	Satisfactory.
170	Aug. 12	Hunter	5	Bad roarer	Excellent	Excellent	Excellent. Sold for £150	Excellent	Lost trace of Now in Belgium
171	Aug. 12	Hunter	5	Bad whistler	Excellent	Excellent	Satisfactory	Sold and lost sight of	Unable to trace further.
172	Aug. 12	Hunter	5	Bad whistler	Excellent	Excellent	Satisfactory	Sold and lost sight of	Unable to trace further.
173	Aug. 12	Hunter	5	Bad whistler	Excellent	Excellent	Satisfactory	Sold and lost sight of	Unable to trace further.
174	Aug. 19	Harness	10	Roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Excellent.
176	Aug. 20	Hunter	6	Roarer	Excellent	Excellent	Satisfactory	Satisfactory	Satisfactory.
178	Aug. 20	Hunter	Aged	Whistler	Satisfactory	Satisfactory	Satisfactory	Sold and lost sight of	—
181	Aug. 21	Hunter	5	Roarer	Excellent	Excellent	Excellent	Satisfactory	Sold and lost sight of.

182	Aug. 22	Hunter	6	Roarer	Excellent	Excellent	Excellent	Excellent	Excellent.
183	Aug. 22	Shire	3	Bad roarer	Excellent	Excellent	Excellent	Excellent	Excellent.
185	Aug. 26	Hunter	9	Bad roarer	Satisfactory	Satisfactory	Excellent	Satisfactory. See notes.	Satisfactory.
186	Aug. 26	Hunter	4	Bad roarer	Satisfactory	Satisfactory	Satisfactory	Sold and lost sight of	—
190	Sept. 8	Hunter	4½	Whistler	Satisfactory	Excellent	Excellent	Satisfactory	Satisfactory.
191	Sept. 13	Hunter	5	Bad roarer	Satisfactory	Satisfactory	Satisfactory	Excellent. See notes	Excellent.
192	Sept. 14	Trooper	11	Bad roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory.
193	Sept. 14	Trooper	7	Bad roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Sold and lost sight of.
194	Sept. 14	Trooper	6	Bad roarer	Excellent	Excellent	Satisfactory	Satisfactory	Satisfactory.
195	Sept. 17	Carriage	5	Bad roarer	Excellent	Excellent	Satisfactory	Satisfactory	Satisfactory.
196	Sept. 17	Hunter	12	Roarer	Satisfactory	Satisfactory	Satisfactory	Relapsed and been tubed	Hunting with tube
197	Sept. 17	Hunter	8	Roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory. See notes	Satisfactory.
198	Sept. 18	Hunter	5	Bad roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Sold. Unable to trace.
199	Sept. 20	Hunter	12	Bad roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory.
203	Oct. 1	Hunter	8	Bad roarer	Bad	Excellent	Excellent	See notes	Sold and lost sight of.
204	Oct. 4	Hunter	9	Roarer	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory until destroyed.
205	Oct. 4	Pony	Aged	Bad roarer	Excellent	Excellent	Excellent	Now dead	—
206	Oct. 7	Hunter	7	Bad whistler	Excellent	Excellent	Excellent	Excellent	Excellent.
208	Oct. 7	Hunter	5	Whistler	Excellent	Excellent	Excellent	Excellent	Satisfactory.
216	Oct. 7	Harness	8	Whistler	Excellent	Excellent	Excellent	Satisfactory	Excellent.

been hunting and doing military work ever since, and is practically all right."

Case 141.—March 27, 1914: "The chestnut hackney gelding which you operated upon for roaring in July, 1910, was still going on satisfactorily up to last May, when it was sold by auction with the other horses."—M.R.C.V.S.

Case 151.—February 22, 1914: "'John Peel' is a great success, and makes no noise at all after three hard seasons."

Case 155.—March 14, 1914: "'Scarlet Runner' is going 'tip-top' this season."

Cases 161, 162, 163.—On March 14 the veterinary surgeon with whom these cases were operated upon in consultation wrote: "Colonel L——'s horse is still carrying him 'the best,' and Miss A——'s horse, too, went splendidly this season, whilst Mr. R——'s horse won a Point-to-Point last week for its new owner."

Case 174.—March 27, 1914. The veterinary surgeon wrote: "Miss H——'s bay horse carried her to hounds well, and also did his harness work in the summer without any distress, although he always made a slight noise. As this horse went a roarer after a very acute attack of pneumonia, he was a distinct success, as previous to the operation he was worthless. Unfortunately he split a pastern and was destroyed."

Case 191.—March 7, 1914: "The grey hunter is going excellently; makes a blowing noise only. Worth £80 at least."

Case 197.—In a letter dated March 15, 1914, the owner wrote: "I have no change to report in my horse, 'Captain Kettle'; he fully maintains the great improvement made in him by your operation.

"I have hunted all the season with the Mid-Kent Staghounds—a very big and heavy country—we have had some very fast runs, and he has not been distressed. Of course, he still makes a slight noise when galloping fast in heavy going, and I occasionally have to slow him down for a minute or two, but apart from this his wind seems quite good. This result is very satisfactory to me, as he is the best horse I have ever ridden, and I value him much. He was turned out to grass all last summer."

Case 204.—March 15, 1914: "This horse was a great success and could gallop to the end of any hunt without any sign of distress. The animal is now dead, having got paralysis of hind quarters, for which it was destroyed."

Case 206.—March 16, 1914: "I sold the horse last year that you operated upon for me. The result of the operation appeared to be permanent. The horse was very much hindered by his wind before the operation, but afterwards it was able to hunt without inconvenience. He was hunting all last season and this."

Case 216.—March, 1914: "The roan mare is very satisfactory, and going better than ever she did. The result of the operation is still quite successful."

REFERENCES.

1. Proceedings of the American Veterinary Medical Association, 1906, 1907, 1911.
2. *The Veterinary Journal*, April, 1913, "The Fourth Season's Report upon the Permanent Value of the Ventricle Stripping Operation for 'Roaring.'"
3. "Il Cornegio e la nuova Operazione" (Congresso Nazionale Veterinario, Turino, 14-16 Settembre, 1911).
4. *The Veterinary Journal*, September, 1912 (a translation).
5. *Receuil de Médecine Vétérinaire.*
6. Communicated.

DEATH OF A FOAL—TOXICITY OF MORPHIA?

By R. C. Jolliffe, F.R.C.V.S. (England), Pickering, Ontario, Canada.

Subject: A male Clydesdale foal, born normally and without assistance, during the night of May 29th, a few days prior to full time. The following morning (May 30th) the foal appeared weak and could not rise or remain standing without help and persistently refused to suck till about 10.30 that night, when, having gained considerably in strength during the day, it commenced for the first time to take nourishment naturally. During the day frequent attempts had been made to induce the foal to suck, but finding them unsuccessful, the mare was milked into a cup and the milk administered to the foal—evidently much against its will—both by spoon and by rubber teat on the end of a bottle. During this period loose respiratory râles in the neighborhood of the larynx and trachea became audible.

The following morning the foal had improved to a remarkable degree; it was sucking frequently and freely and, except for occasional tracheal râles, appeared as healthy, bright and lively as could possibly be wished for, till about 2 p. m., when indications of abdominal pain were noticed. The abdomen was drawn up, the abdominal muscles tense, and the patient evidently uneasy and distressed. The bowels and urine had been in every way normal up to now.

These unfavorable symptoms became rapidly worse and by 4 p. m. it was quite apparent that the foal was suffering acute abdominal pain. The rectum as far as could be explored was empty. About 2 oz. of castor oil with 30 minims Collis Brown's chlorodyne were administered, a few ounces of cow's milk, raw eggs and whisky having been previously given by the attendant. Hot fomentations were applied to the abdomen, and about 8 oz. of soapy water rectally injected. In half an hour's time the evidence of abdominal pain had become still more intensified and the patient appeared to be suffering extreme agony. There was some difficulty in drenching him or persuading him to swallow, and I therefore decided (wisely or unwisely?) to administer half a grain morphinæ sulph. hypodermically.

A little later the pain appeared to be considerably relieved, the patient went quietly to sleep, and died, seemingly in his sleep, about 8 p. m.

Autopsy the following morning revealed nothing abnormal on opening the peritoneal cavity. On slitting up the alimentary track several feet of the small intestine showed marked venous congestion of the mucous membrane. Cæcum, stomach and large intestine normal. One small mass (about the size of a filbert) of dense, impacted fecal matter was present in the small colon. Remainder of abdominal contents normal. Heart and lungs healthy. A large quantity of whitish froth was present in the trachea, extending from the larynx down to many of the larger bronchi, but not extending to the bronchioles or lung tissue. No other abnormality could be discovered in any other organ or tissue of the body. There was red clot in both sides of the heart.

Queries and Observations—1. To what extent was this foal "killed by kindness," coupled with morphia?

2. Should a weakly foal that refuses to suck be forcibly fed during the first 24 hours? If not, at what age should or may forcible feeding be resorted to if still refusing to suck?

3. Is refusal to suck, when newly born, at all a common condition in foals or calves? (I am credibly informed that the human infant is frequently given no nourishment of any kind during the first 3 days of life.)

4. Is the drenching, or forcible administration of milk, a particularly risky or undesirable procedure in the newly born foal, on account of the danger of fluid entering the trachea? In this case there seems no doubt that the froth in the trachea

simply represented milk that had "gone the wrong way," and the appearance of the trachea distinctly suggested that if the foal had survived longer, mechanical pneumonia might have supervened, unless the froth therein became in some other way disposed of. (There was no indication, post mortem, of pulmonary œdema or congestion.)

5. The mare had been in full lactation for a week or more prior to foaling, the milk flowing freely from the udder. The first (colestrum-containing) secretion was thus no doubt wasted through leakage. Might this account for the intestinal congestion, or was the latter more likely to have been set up by the small impacted mass in the floating colon? (There appeared to be no damming back of the bowel contents anterior to this mass.)

6. Are there any grounds for the opinion, apparently popular amongst the "laiety," that a mixture of cow's milk and raw eggs is of value as a laxative for foals?

7. Finally, to what extent was the half-grain of morphia accountable for death? I have a strong suspicion, on reviewing the case, that it probably had a considerable share. Appearances certainly pointed to it, and had not the foal (fortunately?) been my own property, I think I should have lost my client as well as the patient. I know that morphia is regarded with the greatest awe by medical men for the young of the human species, but have never heard that the same applies to the equine infant. I am of opinion that it is practically impossible to kill an adult horse with morphia.

Any comments on the above case by practitioners experienced with foals would be much appreciated by the author.

VENTRAL HERNIA.

By F. F. Brown and J. V. Lacroix, Kansas City Veterinary College.

The accompanying cut is that of a yearling mule sent by Dr. A. A. Shetler, '09, of Wellington, Kan., to the Kansas City Veterinary College for the Missouri Valley Veterinary Association clinic and was examined by several veterinarians and pronounced practically inoperable and was not handled during this meeting.

On January 30 it was thought that this case would be of interest and it was presented at our regular clinic. The subject had been dieted and was placed in a dorsal recumbent position upon the operating table and an attempt was made under com-

plete anesthesia to reduce the hernia, that the margins of the opening in the abdominal parieties might be outlined by palpation, and a definite idea of the position and extent of the hernia be obtained. Reduction by means of external manipulations and taxis was impossible, and it was thought that there existed adhesions

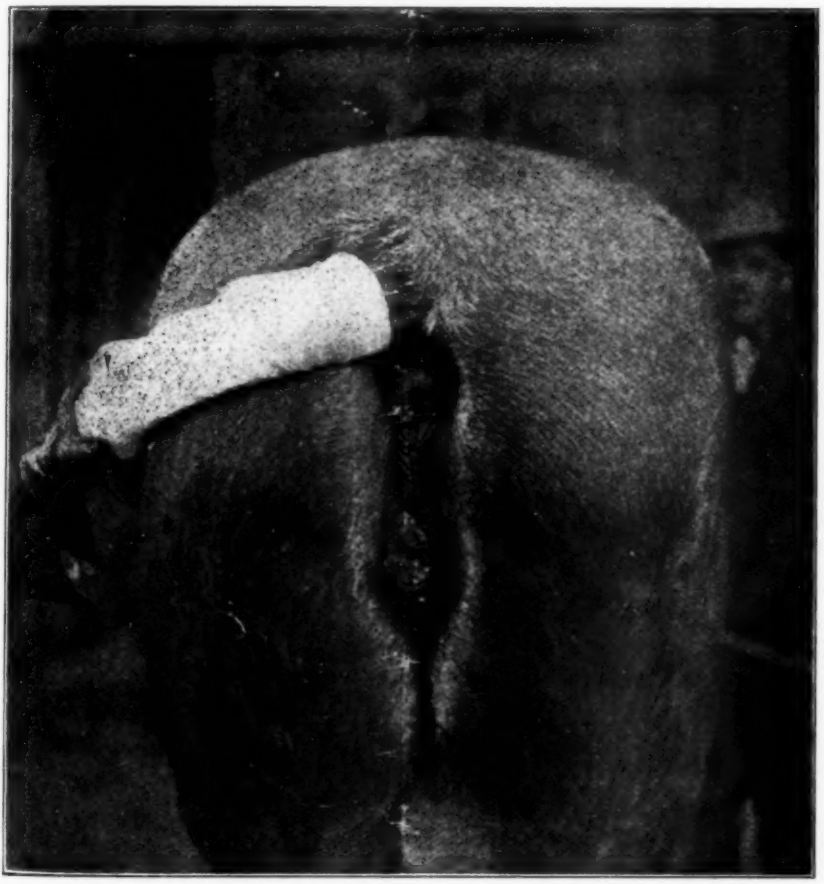
which prevented reduction in this manner. An exploratory laparotomy was done and an incision about ten inches in length was made through the wall of the enterocele, and the parts explored by palpation. It was learned that there existed no adhesions and that reduction of the hernia was impossible because the bulk of the mass rendered it physically impossible to replace the viscera in any manner. The wound was closed by means of continuous sutures, and the subject returned to the stall. It was intended to thoroughly gaunt the animal and possibly try to reduce the hernia at a later date. No particular inconvenience was manifested by the subject during the first few days following the operation, but on February 6th there was evidence of peritonitis, and on February 9th the subject was lost.

An autopsy revealed the fact that there existed in this case

an almost circular opening situated on the left side of the median line of the abdominal floor, beginning immediately in front of the pelvic brim. The margins of the opening were very dense and very much thickened, and it was clearly evident that it would have been practically impossible to permanently reduce this particular hernia.

EPITHELIOMA.

By the Same.



The accompanying cut represents a mare that was purchased at the sales pavilion at Kansas City and was treated at our clinic. Microscopically it presented the appearance of an

epithelioma. It involved practically all of the clitoris and constituted quite a blemish. Extirpation, with amputation of the clitoris, was effected, the parts sutured, and at the end of a week's time the case was apparently progressing very favorably, as the mare was sold without the purchaser noticing the existence of any local disturbance.

SERUM THERAPY.

By S. A. Peck, D.V.S., Oak Grove, Mo.

A seven-year-old bay gelding weighing about 1,200 pounds and used as a driver, was kicked with sharp shoes over the scapulo-humeral articulation, and synovia was discharging from an open wound when the injury was discovered. The wound was cleaned and dressed as often as necessary and bacterin injected every three to five days. The animal returned to work in about three weeks.

A sixteen-month-old draft filly was kicked on the humero-radiouluar joint, causing an extensive suppurating process. Bacterins were injected for about two weeks, at the end of which time the filly was using the limb nicely. The animal attempted to play with some other colts about this time and the next day could not use his limb, being able only to drag it. The bacterin treatment was resumed for about three weeks, but the animal continued to grow worse. Several incisions from the point of injury down to the knee were made and pus was discharged from the openings. As the animal continued to lay around most of the time further treatment was discontinued. Soon afterward the animal began to lick the pus from the wound and it was not long till an improvement could be seen, the animal finally making a complete recovery. This animal was observed two or three times daily and the recovery is credited to auto-medication.

The three foregoing case reports are credited to *The Alumnus* (Kansas City Veterinary College), April, 1914.

Ophthalmic Mallein Test the Necessary Passport for Horses to Enter the State of Rhode Island.—State Veterinarian J. S. Pollard, of Rhode Island, issued the following edict, under date of April 2, 1914: "On and after April 10, 1914, horses, asses and mules from all other states must first have passed an ophthalmic mallein test before entering Rhode Island."

ABSTRACTS FROM EXCHANGES.

ENGLISH REVIEW.

By Prof. A. Liautard, M.D., V.M.

Compound Comminuted Fracture of the 7th and 9th Ribs [*W. Cargill Patrick, F.R.C.V.S.*].—A well known race horse, while on the track and running, suddenly stopped his gait and had to be taken home, being in pain, sore and stiff all over. When in his box he appears as having bowel trouble, and received a laxative dose of oil. The fourth day after, the writer saw him, and by the marked evidence of chest trouble, a great swelling over the ribs and a certain amount of cutaneous emphysema, compound fracture with pleurisy was suspected. Poultice jacket with firm bandaging was applied, febrifuges administered. Twenty-four hours after, foetid breath was well marked. The case being hopeless the horse was destroyed. At post mortem there was found fractures of the 7th and 9th ribs, at both their upper and lower thirds respectively, with a large splinter from the anterior edge of the seventh rib embedded in the lung. Pleuritic lesions existed at the upper fractures. The fractures were the result of the "bucking" of the animal at the time of starting in the race.—(*Vet. News.*)

Clinical Cases [*J. H. Parker, M.R.C.V.S.*]—*Horn On Cow's Neck.* A cow had on the neck a small tubercle, about the middle third. It was removed and proved to be a perfect little horn, an inch and a half long and of the same shape as the cow's horn. Instead of a horn core, it was a soft matrix that looked like yellow, firm cartilage.

Vomition in the Horse. A horse is found vomiting all over his box. On examining him there was found on the lower left side of the jugular vein (not the oesophagus) a thickening an inch long which felt like a stricture of the vein. Pressure upon it would bring on tremendous retching. An hypodermic injection of morphia was made. The next morning the horse was well.

Had the thickening been the oesophagus, the vomiting could be explained, but being in the jugular vein it was puzzling.—(*Vet. Rec.*)

PLEURO-PNEUMONIA OF GOATS IN INDIA [*Major G. K. Walker, F.R.C.V.S.*].—A very fatal form of pleuro-pneumonia in goats was brought to the attention of the writer, who having had no opportunity to investigate personally came to a diagnosis by the various reports of veterinary assistants and from morbid specimens which he had examined. Investigations and experiments were also made at the Punjab Veterinary College laboratory while the temperature of all experimented animals was regularly taken and all the clinical symptoms recorded. From all those the following conclusions were arrived at: "The pleuro-pneumonia of goats met with in Kangra appears to be identical with the enzootic pleuro-pneumonia of goats described by Nocard and Leclainche as occurring in Algeria, the Pyrenees and the Thuringian Mountains. The symptoms and lesions are similar and the failure to transmit the disease from animal to animal is coincident. The value of the above experiments (which are minutely described) is depreciated, no doubt, from the fact that plains animals had to be used." If possible, further investigations with hill goats will be made, with the object of proving the possibility of transmission by means of intrapulmonary inoculation.—(*Journ. Comp. Pathol. & Therap.*)

ARSENICAL TREATMENT OF SURRA IN HORSES [*By the same*].—This is the record of four cases which show the peculiar and rather unsuccessful results obtained by Holme's treatment, whose instructions were closely observed. The control case from which the animals were inoculated was an aged country-bred pony that had been inoculated from a control surra-dog. The disease ran a typical course and the pony died thirty-four days after organisms first appeared in the blood. He was a weak and aged animal which died sooner than was expected.

The results brought out the following conclusions: "In view of Holme's success with this treatment where 70 per cent. of cases were cured, the records of the four cases are most disappointing." (The treatment failed with all). One having died with arsenic poisoning, and in the other three where full subtoxic doses had been given the trypanosomes were not destroyed and reappeared in each case after two courses of treatment.

Holme's work has been on the whole very successful and is full of promise. He has also recorded some failures. Further investigations are necessary for the discovery of means more reliable in the treatment of that disease.—(*Ibid.*)

A Case of John's Disease Successfully Treated [*Sir John McFadyean*].—The record of this Devon cow is illustrated with two photos. One taken a few days after the treatment was begun in August, 1913, and the other on the 27th of January. In the former the animal is shown in its bad condition. She was very weak, without appetite, cold extremities and more or less diarrhoea. The treatment which consisted in the administration daily of one ounce of a solution of ferrous sulphate, 5 ounces with dilute sulphuric acid and water one pint. At first there was rather want of condition and the treatment had to be stopped. Taken up again after a few days, gradual improvement became manifest and after about two months the condition was steadily gaining. The cow had gained some 112 pounds. The feeding of the animal had been hay *ad libt.*, and daily a few pounds of oats and bran. To all appearance then the cow has recovered, but until post mortem is made the question remains: Has the recovery been absolutely complete. As bearing on this point, concludes the author, it may be mentioned that when the cow was tested subcutaneously with "*Johnin*," a material analogous to tuberculin, but prepared from the bacilli of John's disease, the maximum rise of temperature during the following eighteen hours was 1.6° F., but there was a marked reaction to a simultaneous ophtalmic test with tuberculin.

This is but a case—others similarly treated will be the object of further communication.—(*Journ. of Comp. Path. & Ther.*)

A Complicated Case [*E. R. Routledge, F.R.C.V.S.*].—It certainly was a complicated case, which lasted from September, 1912 to after September, 1913.

Relieved first of an abdominal testicle weighing 2 ounces, and of a scrotal of 9 ounces, the colt was successively taken with hemorrhage of one and afterwards of the other operated testicular region—complicated with troubles of the penis swollen and pendulous. He then had laminitis, got over that, when gastric disturbances manifested themselves. The penis remaining in its paralyzed and swollen condition was amputated, hemorrhage

occurring from the stump and requiring ligature of the stump. Being turned out to recuperate, the colt takes colics and finally the urethral opening having partly closed another operation was required, which seemed to end the series of troubles. The animal urinating freely.—(*Vet. Journ.*)

NOTES ON CASES OF SPAVINS RELIEVED BY CUNEAN TENOTOMY [*Capt. Percy Argile, F.R.C.V.S., A.V.C.*].—These are the records of first a bay mare which had a spavin of the near hind leg, for which she had been treated by five pyro-punctures with the ether cautery. After a temporary relief the lameness had returned and the bony enlargement considerably increased. It is then that the operation was performed and followed by excellent results, the mare returning to work after a few weeks.

The second case is that of a gelding, also lame on the near hind leg by a diffuse exostosis, which had also been fired. The same operation of cunean tenotomy was performed with a similar result, returned to steady work after a short time.—(*Ibid.*)

COMPLETE REMOVAL OF THE PREGNANT UTERUS AND OVARIES IN A BITCH [*J. Legg, B.V.Sc., and H. R. Seddon, B.V.Sc.*].—When ten months old a Yorkshire terrier bitch had a difficult labor and gave birth to one dead pup. Having got in pups again, she had a dead one at the proper time, but was thereafter taken with uneasiness, whining without delivering more little ones. Examination revealed a pup which could not be extracted. An operation is imposed, and as the bitch is very weak and would not stand the Caesarian, hysterectomy was performed. At one time artificial respiration had to be resorted to. The ovaries and uterus were removed. The wound closed, healed rapidly and recovery complete after fourteen days. The pup in the uterus was dead and could not have been expelled by the normal passage.—(*Ibid.*)

FRENCH REVIEW.

By Prof. A. LIAUTARD, M.D., V.M.

FOREIGN BODY IN THE PHARYNX [*Prof. Charmoy*].—Such accidents are frequent and this one presents an unusual interest by the situation occupied by the foreign body, the difficulty of diagnosis and the complications that followed it.

After giving the history of the case: Small dog, gluttonous eater, having enjoyed meat and bones thrown to it while its owner is taking his meal, suddenly showed signs of choking, coughing, vomiting, etc. After three days he was brought to the writer, who made an examination by external palpations of the pharnyx, by buccal inspection during which he was bitten slightly, but with all that, failed to detect the presence of the foreign body. Catheterism of the oesophagus was made quite easily. The diagnosis remained uncertain. The dog died the next day. At the post mortem was found, at the entrance of the larynx, immediately behind the epiglottis, between it and the arytenoids, a piece of bone, implanted across in the lateral walls of the pharynx, where congestion and swellings were evident. The trachea and bronchia were filled with spumous muco-purulent fluid and the lungs hepatized and numerous centers of gangrene and abscesses forming.—(*Rec. de Med. Vet.*)

AMPUTATION OF THE UTERUS IN COWS [*Mr. A. Fafin*].—The writer has had two occasions, in cows suffering with unreducible prolapsus uteri, to perform with them this operation, resorting to the elastic ligature method.

The first case proved unsuccessful. The cow dying in forty-eight hours, notwithstanding injections of antiseptic solutions and careful hygienic attentions.

The second case treated in the same manner made an excellent and rapid recovery. In both cases the condition of the uterus had been very bad, ulcerated, swollen or even gangrenous in some spots. In the first case, a successful reduction with ligature of the vulva had been followed by a return of the prolapsus.

The author recommends the operation, specially when other methods of treatment appear to be likely to be followed by failures, and as long as even cases, apparently hopeless, do recover by the operation.—(*Ibid.*)

PROLAPSUS OF THE UTERUS IN SOW [*O. Lebrun*].—A sow, aged 10 months and weighing 60 kilogramms, was found one morning lying down with a dead foetus alongside of her and her uterus prolapsed. On exploring the abdomen the presence of other foetuses is detected. The prolapsed horn is free from injury. The animal is secured with the legs tied above the hocks. With boiled water the horn, carefully raised with a wide cloth on which it lays, is washed of all soiling matters and by slow

and moderate pressure and manipulations is gradually returned to its position. Water is thrown in the cavity of the horn, the hind quarters of the sow are raised up and after a few minutes she is left free and let walk to her pen. No bandage, no suture is applied. During the day she had some slight colics, and then delivered two more dead foetuses. She cleaned well and was all right after a few days.

Conclusions of the Author.—In multiparous females, prolapsus of one horn may occur, while the other contains other foetuses which will be delivered when the prolapsus is reduced without danger of its return unless the bottom of the horn is not thoroughly freed from all cause of irritation. Again, unless one is sure that all the contents of the uterus are expelled, it is better not to have recourse to suture of the vulva or to any bandage of contention. Finally, notwithstanding all the difficulties that the veterinarian may find before him he must always attempt to relieve an animal in such condition, which as in the present case might end satisfactorily with another more daring.—(*Rec. de Med. Vet.*)

A Case of Bovine Tuberculosis in Man [*Doct. Beitzke*].—A fourteen-year-old boy treated for severe anhemia died. At the post mortem extensive lesions of the most severe tuberculosis were found. Lymph glands enormously enlarged and caseous. The peritoneum was diseased, intestinal ulcerations were exposed, lungs with tubercles and spleen also infected. Two guinea pigs and a rabbit inoculated died with generalized tuberculosis. All the attempts made for cultures remained negative. Bovine tuberculosis was suspected and the family history revealed that all, the father and mother, sisters and brothers, were healthy, but the deceased boy used to drink every day one or two glasses of milk freshly taken from the cow. A rabbit was then used as experiments with bacilli obtained from the organ of the guinea pig treated by antiformine. About a dozen of bacilli of Koch were injected in each eye of two rabbits. Three became tuberculous and both rabbits died with severe generalized tuberculosis. From the researches of Schiek this experiment shows that the bacilli were bovine origin.—(*Presse Medicale.*)

Faradisation in Veterinary Therapeutic [*Major Ducher, Army Veterin*].—Under the title of *Muscular Atrophies of Traumatic or Surgical Origin,* with the treatment by Faradisa-

tion, the author calls the attention to the advantages and the good results that one may obtain with this mode of treatment, which unfortunately is rather neglected in veterinary practice. He relates three cases where with the use of small apparatus at interrupted current of Gaiffe he has obtained very important and beneficial results.

A first case was that of a pup fox terrier, eight months old, which by an accident had fractures of the hind legs, the right in one and the left in two places. Treated for these and comparatively recovered of his fractures with callous and some deformity, he also had a severe atrophy of the thigh and leg that ordinary treatment failed to improve. Faradisation was resorted to and with it, after the 10th application, improvement begins to appear. After thirty applications the muscles had resumed their size and the callous of the fracture reduced in a noticeable manner. There remained no lameness.

Another case, a large dog had a simple fracture of the right cubitus. After recovering of this the dog had another of the right humerus. He also was cured of this, but a marked atrophy of the muscles of the fore arms and of the brachial region had to be treated. Faradisation was resorted to. After 10 sittings the atrophy began to improve and the callous of the fracture diminished in size.

A third case is in a seven-year-old gelding which was disabled, probably the cause of it was muscular ruptures. After three months of various treatment the muscular atrophy which existed and gave rise to a severe lameness was very great, involving the four extensors of the anterior radial region. Faradisation was applied. After four sittings of an hour the animal showed a well-marked improvement in his gait. The treatment was continued until 30 applications had been made. The recovery was completed and all signs of lameness and weakness had disappeared.—(*Rev. Gen. de Med. Vet.*)

MARRIAGE OF SECRETARY MAYO'S DAUGHTER.—Miss Marguerite Kedzie Mayo, daughter of Dr. and Mrs. Nelson S. Mayo, will be married July 2, 1914, to Mr. Ashe Lockhart, at Christ's Church, Blacksburg, Virginia.

DR. MILLER BECOMES BENEDICT.—Dr. Daniel Sutter Miller, Philadelphia, Pa., was married on June 15, 1914, to Miss Minnie Edith Yetter, East Stroudsburg, Pa. We wish the couple all the happiness of wedlock.

CORRESPONDENCE.

SOME OBSERVATIONS ON THE IMPORTATION OF PURE-BRED BEEF AND DAIRY CATTLE.

SAO PAULO, BRAZIL, May 1, 1914.

Editor AMERICAN VETERINARY REVIEW, *New York:*

The importation of pure-bred beef and dairy cattle from North America to the South American countries, Brazil and the Argentine Republic, is a question of vital importance to the North American breeders having high-class animals of choice breeding and who care to enter these markets.

There is now a brisk demand for high-class and especially high-priced animals in the countries south of the equator.

Argentine buyers have invaded Europe and set the high mark in values, purchasing and importing all of the first-class individuals.

Brazil imports her pure-bred cattle from Europe, Argentine and North America. In past years many zebus were brought from India, and their blood has pretty thoroughly saturated the national cattle of Brazil. They are now considered undesirables, and representatives of the breed are no longer kept at the government experiment stations.

The breeds that find favor in the various sections of Brazil and Argentine are: Short-horns, Herefords, Angus, Holstein, brown Swiss, Simmenthal, Flemish and the French Limousine.

Since it has developed that there is a good market south of the equator, conditions governing the importation to South America should be most carefully studied; as success or failure depends largely upon a full understanding of the obstacles which are in the way.

The information gleaned from different sources has led many to believe that young animals bred and raised below the government quarantine line, and naturally immune to Texas fever, would not react when imported to the tick-infested regions of Brazil.

The same should be true in a general sense with regard to northern cattle artificially immunized.

After two years' experience in handling a large number of pure-bred cattle, both naturally and artificially immunized, and imported from below the quarantine line in the State of Texas, to the States of Parana and Matto Grosso in Brazil, I am prepared to say that the foregoing statements are misleading and not altogether in accord with our observations.

In conclusion I beg to submit for careful consideration the following:

Animals Naturally Immune.—Bulls and heifers bred and raised below the quarantine line in North America. (Infested with the Margaropus Annulatus at the time of exploration.) Naturally immune to piraplasmosis as it exists in North America, react to the subcutaneous inoculation of blood from an immune Brazilian bovine, or to natural tick infestation with the Margaropus Australis, the fever tick indigenous to Brazil.

The reaction may be mild and the symptoms scarcely noticeable; however, the course may be acute and terminate in death, with all of the symptoms and post-mortem findings of acute Texas fever.

The older and more mature animals belonging to this class (*naturally immune*) withstand tick infestation much better than the younger, immature bulls and heifers.

Animals Artificially Immunized.—Northern North American bulls immunized in Texas and subsequently inoculated subcutaneously with blood from a Brazilian cow, give a *reaction* which may be mild and transitory, or very acute, ending in death.

The same is true when immunity is acquired through tick infestation from pastures.

Vaccination in North America does not protect against Brazilian infection, although it may modify the course of the disease, making it benign in character.

Importations from England and Argentine suffer from a high percentage of loss from Brazilian Piraplasmosis.

Vaccinated animals from Argentine Republic may also sicken and die, and the results are very unsatisfactory.

Native cows did not react to subcutaneous inoculation with blood from southern Texan cattle.

The importation of pure-bred cattle into Brazil bristles with many difficulties; however they will be overcome in time and we will see the dawn of a new era for the cattle industry in this South American country.

J. H. McNeil.

STATE OF NEW YORK, DEPARTMENT OF AGRICULTURE.

ALBANY, June 3, 1914.

Editor AMERICAN VETERINARY REVIEW, *New York:*

You are probably aware that at the present time this Department is making special effort in the eradication of glanders from New York State. We feel that our methods of diagnosis are becoming so refined and accurate and our methods of control so practical and efficient, it is our hope to gradually close in upon all the infected centers and confine the spread of glanders to the smallest possible area, to the end that this costly plague may be reduced to a minimum, if not entirely eradicated from our State.

During the past year, under the efficient direction of Dr. Gill, with the co-operation of the officials and veterinarians of the City Health Department, the work of controlling glanders in New York City has become creditably systematized, but with all this precaution our official statistics show that a high percentage of all cases of glanders in New York State occurring outside of New York City proper bear origin with the introduction of an infected animal in these localities either from New York City or from some adjoining State.

With these facts in view the Commissioner of Agriculture has seen fit to declare a quarantine against the introduction and distribution of diseased horses in our State and the movement of horses from New York City to other parts of the State without proper inspection. We are enclosing copies of such quarantine orders and will appreciate any assistance you may give this Department.

Yours truly,

J. F. DEVINE,
Consulting Veterinarian.

(2 enclosures.)

STATE OF NEW YORK, DEPARTMENT OF AGRICULTURE.
NOTICE AND WARNING AGAINST GLANDERS OR FARCY.

ALBANY, N. Y., May 28, 1914.

To whom it may concern:

Pursuant to the provisions of Section 91 of the Agricultural Law, I, Calvin J. Huson, as Commissioner of Agriculture of the State of New York, hereby give notice that the contagious or

infectious disease known as GLANDERS or FARCY exists or recently existed in that portion of the State of New York known and designated as The City of New York. Therefore, in accordance with the authority conferred and duty imposed upon me as such Commissioner by the provisions of Article 5 of the Agricultural Law as amended, I hereby order and direct as follows:

1. That no person or persons shall remove or assist in removing from within the said City of New York any equine animal to any point or points outside of the said city during the pendency of this notice and order, unless such person or persons shall have first received a permit duly issued by the Commissioner of Agriculture of the State of New York, authorizing the removal of such equine animal or animals from said city.

2. Nothing in this order shall be construed to forbid the transportation by common carriers of equine animals from points without the State to their points of destination within the State, or to such equine animals transported from points without the State to points in other States, although in such transit they pass through the State; nor shall it apply to healthy equine animals in performance of their daily work.

This notice and order and regulations issued thereunder will continue in full force and effect until formally withdrawn.

CALVIN J. HUSON,
Commissioner.

To whom it may concern:

Whereas, infectious or contagious diseases affecting equine animals in the State of New York are believed to be greatly increased from animals brought into the State,

Therefore, I, Calvin J. Huson, as Commisisoners of Agriculture of the State of New York, pursuant to the provisions of Section 93 of the Agricultural Law, hereby order and direct as follows:

1. That all persons importing or bringing any equine from or through the States of New Jersey, Pennsylvania, Connecticut, Vermont or Massachusetts into the State of New York shall notify the Commissioner of Agriculture of the State of New York in writing immediately upon the shipment of such animals into the State of New York, giving information as follows:

(a) The point of shipment.

(b) The route or routes over which said animal or animals are to come into the State.

(c) The point of destination within the State.

(d) The time or probable time of arrival of such animal or animals at place of destination within the State.

2. That the said animals so shipped, imported or brought in shall be held at such point of destination within the State for inspection and examination by the said Commissioner of Agriculture or his duly authorized representative at least ten days from the time of arrival at such point of destination, unless sooner released by the Commissioner of Agriculture or his duly authorized representative.

CALVIN J. HUSON,
Commissioner.

Grenada, Miss., June 19, 1914.

AMERICAN VETERINARY REVIEW, *New York:*

GENTLEMEN.—Knowing the interest you feel in all veterinary meetings I am herewith enclosing to you the proceedings of the first Mississippi State Board of Veterinary Medical Examination for publication in your journal.

With best wishes for you and your monthly publications I am, with every expression of regard,

WM. P. FERGUSON,
Secretary of Board of Examiners.

PROCEEDINGS, MISSISSIPPI STATE BOARD OF VETERINARY MEDICAL EXAMINERS.

The Mississippi State Board of Veterinary Medical Examiners, viz.: Drs. O. M. Norton, of Greenville, and Wm. P. Ferguson, of Grenada, appointed by the Governor, and Drs. John Oliver, of Columbus; E. M. Ranck, of the Agricultural College; and James Lewis, of Greenwood, elected by the State Veterinary Medical Association, held their first examination in the City of Jackson, Miss., at the Capital on Tuesday, June 16, 1914.

All applicants presenting diplomas from reputable veterinary colleges were given licenses as follows: Drs. E. M. Ranck, A. & M. College; John Oliver, Columbus; O. M. Norton, Greenville; James Lewis, Greenwood; J. D. Townsend, Louisville; B. M. Leigh, Meridian; T. B. Lee, Winona; Ge. S. Smith, Vicksburg; W. R. Edwards, Vicksburg; J. T. Olson, Tupelo; E. M. Buie, Natchez; J. A. Beavers, Canton; J. A. Bargers, Coffeeville; H.

Chadwick, Jackson; L. W. Edwards, West Point; W. L. Gates, Clarksdale, Edward Hiney, Hattiesburg; W. J. Hossley, Vicksburg; Frank Hecker, Meridian; R. J. Heyde, Laurel; E. I. Keller, Okalona; W. O. Ney, Michigan City; Robt. Reves, Moulden; G. P. Sands, Sumner; S. W. Sullivan, Columbus; C. G. Stallworth, Shelby; Thomas Trinder, Vicksburg; P. C. Taylor, Corinth; M. A. Arrington, Laurel; J. F. Barnett, Yazoo City; Frank Henry, Holly Springs; E. S. Norton, Greenville, E. C. Riddle, Louisville; S. J. Horn, Straton; S. E. Osborne, Greenwood; B. S. Barkeley, Macon; E. M. Alderman, Starksville; J. T. Harrison, Amery; E. R. Swim, Indianola; L. E. Miller, Jackson; C. B. Hock, Jackson; B. M. Davenport and Wm. P. Ferguson, Grenada.

Those taking examinations, viz.: B. E. Green, G. B. Moss, G. D. Brock, C. McMillen, all passed and given license except G. B. Moss.

Quite a number of applicants were turned down for lack of satisfactory proof as to qualifications. The Board passed resolutions to take up the matter of Army Bill No. 4541, with their friends and clients and to urge the support of their Senators and to assist Dr. Ranck, Mississippi Secretary for the American Veterinary Medical Association, in soliciting subscriptions to the New Orleans meeting, which takes place in December next.

The Board will hold its next regular examinations in Jackson, Miss., on the 3d Tuesday in June, 1915. All applicants in future that cannot furnish the Board with satisfactory proof that they have passed some State Board of Veterinary Examiners will be required to take the examinations.

WM. P. FERGUSON,
Secretary and Treasurer of Board of Examiners.

PORTLAND, ME., June 7, 1914.

Editor AMERICAN VETERINARY REVIEW, *New York:*

On May 29, 1914, the Maine Board of Veterinary Examiners met in Waterville for the purpose of reorganization. Dr. H. B. F. Jervis was elected president; Dr. W. L. West was elected treasurer, and Dr. W. H. Lynch was elected secretary. Election over, the chief business of the meeting was discussion of reciprocity with other states in having these examinations synchronize more or less with those throughout the nation.

It was agreed among us that, as a means of uniformity, if it were agreeable to you to publish these reports that they should be sent you after each examination—we have four a year—and if the other states saw fit to send their reports we should be very glad to send ours that we may be in entire accord with other boards throughout the nation, looking forward to the time when one examination should entitle a man to practice in any state, which would be fair.

For the convenience of men outside who are coming in to take this examination in Maine, the president desires to have you publish the name and address of the secretary, which is:

W. H. Lynch, D.V.S.,
Portland Veterinary Hospital,
Portland, Maine.

Dr. John H. Jacobus Dead.—Dr. John H. Jacobus, one of the oldest veterinarians of the "West Side," New York City, died suddenly on April 14, 1914. He was a member of the A. V. M. A.

Dr. Steve Trabue Dead.—Dr. Steve Trabue, of Shawhan, Kentucky, died about the middle of June at the Good Samaritan Hospital, Lexington, of a malignant growth of the liver, at the age of fifty years.

Autotherapy Scores.—In Dr. S. A. Peck's report of cases, under caption of *Serum Therapy*, on page 470, present issue, he very justly credits the recovery of his second case to "auto-medication" after treatment had been discontinued. It is certainly very interesting.

Proceedings, New York State Breeders' Association.—These proceedings issued under bulletin number 59 are gotten up in splendid form. A speaking picture of Hon. Calvin J. Huson, Commissioner of Agriculture of the State and president of the association, appears as a frontispiece. The booklet contains 108 pages, which are filled with valuable reading in the form of papers and addresses from experts on breeding problems, and contains excellent cuts of seven of the contributors to the program. It is a very pleasing and instructive report and makes valuable reading.

BIBLIOGRAPHY.

THE COMMON COLICS OF THE HORSE.

THE COMMON COLICS OF THE HORSE—THEIR CAUSES, SYMPTOMS, DIAGNOSIS AND TREATMENT, by H. Caulton Reeks, F.R.C.V.S., Examiner in Pathology and Bacteriology to the Board of Examiners of the Royal College of Veterinary Surgeons, and Author of Diseases of the Horse's Foot. Third Edition, 369 pages, with 32 illustrations. Chicago, Alexander Eger, 1914.

Eleven years ago it was our privilege to review the first edition of this valuable work, published by Baillie, Tindall and Cox, London; and to-day the third edition, even more valuable by the inclusion of additional knowledge on the important subject of which it treats, published by one of our own American veterinary book publishers, has been placed in our hands for review. In our review of the first edition, we made the following statement, on page 1134, Volume XXVI, No. 12, AMERICAN VETERINARY REVIEW (March, 1903). "No practitioner of veterinary medicine will dispute the assertion that, no matter how well a veterinarian may be fitted for every other branch of his calling, his ability to successfully or unsuccessfully cope with the conditions resulting from acute or subacute digestive derangements, may be translated into his success or non-success as a practitioner." We entertain exactly the same view to-day, more strongly impressed upon us if possible, by eleven years more experience with that class of cases. It could not be otherwise; because the longer and closer we study intestinal disorders in the horse, the greater is our appreciation of the number of causes that account for the group of symptoms we have learned to recognize under the head of "colic," and of the necessity for a specific treatment for each of the causes manifested by the symptoms.

Mr. Reeks fully appreciated these facts when he presented his first volume (dedicated, as is the present one, to Sir John McFadyean), and hoped that his work would act as a stimulus which would create a tendency for a more careful study of digestive troubles in the horse by veterinary practitioners; and we feel certain that his hope has been realized; as the subject of intestinal disorders in the horse is surely claiming more than the passing notice of earnest, thoughtful members of the veterinary profession of America who will welcome this third edition with the additional valuable data. The first edition referred to contained 17 chapters that seemed at the time to cover every possible phase of the symptoms, diagnosis and treatment of "colic," the second edition was abreast of the times when issued, and now we have

reached the third edition, with five additional chapters in the book proper and seven additional subjects treated in the appendix, aggregating 128 additional pages over the first edition, devoted to up-to-date findings on the subject of intestinal disorders in the horse as follows: Volume X devotes 13 pages to the elucidation of the subject of the *Subacute Obstruction of the Pelvic Flexure of the Double Colon;* Chapter XVIII devotes 11 pages to the discussion of *Subacute Obstruction of the Caecum;* Chapters XIX, XX and XXI, consider *Displacements of the Double Colon;* devoting 75 pages to the subject. Chapter XXII devotes 3 pages to *The Possibility of the Spontaneous Reduction of the Bowel in Torsion;* Chapter XXIII treats of the *Comparative Rarity of Enteritis;* devoting 6 pages to it. The 20 additional pages in the appendix include the following subjects: (1) *The Use and Abuse of Sedatives in the Treatment of the Equine Colics;* (2) *The Sedatives in Common Use;* (3) *Circumstances Which Have Led the Veterinarian to the Frequent Administration of Sedatives;* (4) *Major Points in an Argument for the More Restricted Use of Sedatives;* (5) *Cases of Colic in Which Sedatives Are of Service;* (6) *Cases of Colic in Which Sedatives Are Harmful;* (7) *Further Remarks On the Use of Aloes in the Treatment of Intestinal Impaction.* All these interesting and instructive subjects, remember, are *additions* to the splendid comprehensive matter embraced in the seventeen chapters and appendix in the first edition, which has taught so many useful lessons on the subject of "colic" and inspired so many veterinarians on both sides of the Atlantic to make a scientific study of this all important subject. So that *Reeks' Third Edition of the Common Colics of the Horse* is at once an inspiration and a guide in the study of one of the most common and fatal conditions to which the horse is heir, and should be in the hands of *all* veterinarians everywhere. The book is well and neatly bound in olive green cloth with gold lettering and is attractive in appearance. The paper is excellent, the cuts good and the type sharp and clear.

YEAR BOOK.

YEAR BOOK OF THE UNITED STATES DEPARTMENT OF AGRICULTURE, 1913; more than 500 pages with 75 illustrations. Washington, Government Printing Office, 1914.

This most interesting report from the government press was received during the month of June. It contains a most interesting and comprehensive report from Secretary Houston, covering 65 pages, a chapter on Applied Entomology, one on Factors of Efficiency in Farming; Promises of New Fruits; Health Laws; The American Thrushes Valuable Bird Neighbors; chap-

ters on Tree Surgery; Supplementing Our Meat Supply with Fish, etc., etc.; Production of Beef in the South; The South American Meat Industry (by Chief Melvin, B. A. I.) and an Appendix which starts with a consideration of Agricultural Colleges in the United States and concludes with a very valuable chapter on Animals Imported for Breeding Purposes for Which Certificates of Pure Breeding Have Been Issued. The cuts of cattle beef and farming are very interesting, and the colored plates of ripe fruit strikingly exact. The book contains much of interest to veterinarians.

POULTRY DISEASES AND THEIR TREATMENT.

POULTRY DISEASES AND THEIR TREATMENT, by B. F. Kaupp, M.Sc., D.V.S., Commissioner of Health, Spartanburg, South Carolina; Author of Animal Parasites and Parasitic Diseases; formerly Professor of Pathology, Division of Veterinary Medicine, Colorado Agricultural College, and Pathologist to the Colorado Agricultural Station; formerly Professor of Parasitology, Kansas City Veterinary College, and Director of the Anatomy Laboratory; formerly Veterinary Inspector, Bureau of Animal Industry, U. S. Department of Agriculture; Chairman of Committee on Diseases of the American Veterinary Medical Association, 1911, etc., etc.; 181 pages, with 44 illustrations. Chicago; American Journal of Veterinary Medicine, 1914.

This neat little work came into our hands last month, too late to receive more than an acknowledgment of its receipt. The poultry industry is so great throughout our vast country, and disease amongst the birds so prevalent at times, that modern veterinarians must of necessity be conversant with the pathological conditions to which poultry are heir, and with the proper scientific methods employed in treating them. They will therefore welcome this little work of Prof. Kaupp's, especially written to fill a demand not only from veterinary students in poultry husbandry, but also by veterinary practitioners whose fields of practice bring them in close relation with raisers of poultry. The work is divided into sections, as follows: 1, Anatomy; 2, Sanitation; 3, External Parasites; 4, Internal Parasites; 5, Diseases of the Digestive Tract; 6, Diseases of the Blood; 7, Constitutional Diseases; 8, Diseases of the Liver; 9, Diseases of the Ovary and Oviduct; 10, Tumors; 11, Diseases of the Respiratory Passages; 12, Diseases of the Legs and Feet; 13, Diseases of the Brain; 14, Bacteria of the Intestinal Tract of Chickens; 15, The Egg; 16, Isolation of Non-layers; 17, Malformations; 18, Fractures—Wounds—Anesthesia. A careful consideration of the many subjects treated in each of the foregoing sections, in the thorough manner characteristic of Prof. Kaupp, has left nothing to the imagination in reference to the ailments of poultry and their treatment.

NEWS AND ITEMS.

VETERINARIANS, TAKE NOTICE.

The attention of veterinarians, physicians and dentists is called to the fact that after July 1, 1914, the prescribing of habit-forming drugs is subject to the provisions of the so-called "Boylan Law." This applies to chloral, opium or any of its salts, alkaloids or derivatives, or any compound or preparation of any of these.

Prescriptions for the drugs just enumerated must be written upon specially prepared official order blanks, serially numbered and duplicated, furnished by the local Board of Health. Physicians, druggists, veterinarians and dentists must record the name and address of each person for whom any of these drugs are prescribed. A supply of the official order blanks has been ordered by the Department of Health and it is hoped it will be available for distribution within a few days.

In view of the wide-spread illegitimate use of habit-forming drugs, and of the inadequacy of existing laws to control the evil, it is hoped that physicians generally will heartily co-operate with the authorities, and comply both with the letter and the spirit of the new legislation.

The Boylan Law.

245. Sale prohibited; exception. No pharmacist, druggist or other person shall sell, have or offer for sale or give away any chloral, opium or any of its salts, alkaloids or derivatives or any compound or preparation of any of them except upon the written prescription of a duly licensed physician, veterinarian or dentist, provided that the provisions of this article shall not apply to the sale of domestic and proprietary remedies, actually sold in good faith as medicines and not for the purpose of evading the provisions of this article, and provided further that such remedies and preparations do not contain more than two grains of opium, or one-fourth grain of morphine of one-fourth grain of heroin or one grain of codeine, or ten grains of chloral or their salts in one fluid ounce or if a solid preparation, in one avoirdupois ounce, nor to plasters, liniments and ointments for external use only.

246. Prescriptions; certificates. It shall be unlawful for any person to sell at retail or give away any of the drugs, their salts, derivatives or preparations mentioned in section two hundred and forty-five of this chapter except as herein provided without first receiving a written prescription signed by a duly licensed physician, veterinarian or dentist. The prescription must contain substantially the following: The name in full of the

physician, veterinarian or dentist issuing such prescription, his office address, his office hours, and telephone, and the name, age and address of the person to whom and date on which such prescription is issued. It shall be unlawful for any duly licensed physician, veterinarian or dentist to issue any such prescription containing any of the drugs, their salts, derivatives or preparations mentioned in section two hundred and forty-five of this chapter except after a physical examination of any person for the treatment of disease, injury or deformity. It shall be unlawful for any person to sell at retail any of the drugs or preparations of any of those mentioned in section two hundred and forty-five of this article without first verifying the authority of any prescription containing more than four grains morphine, thirty grains of opium, two grains of heroin, six grains of codeine or four drams of chloral. Such verification can be made by telephone or otherwise. Such prescription so received shall be filled out at the time of receiving the same for the full quantity perscribed and no prescription so received shall be filled out more than ten days after the date which the said prescription be dated. Such prescription, from which no copy shall be taken, shall be retained by the person who dispenses the same and shall be filled but once. Such prescription shall be kept on the general prescription file and given a regular consecutive number on such file. On such prescription shall be inscribed the name and address of the purchaser making such purchase and the date upon which said sale is made. Any person who sells at retail, furnishes or dispenses any of the drugs mentioned in section two hundred and forty-five of this chapter upon a written prescription by a duly registered physician or veterinarian or dentist shall at the time of dispensing the same, place upon the package a label or deliver therewith a certificate stating the name and address of the person selling or furnishing the same, the name and address of the physician, veterinarian or dentist upon whose prescription such sale is made, the date of sale, and the name of the person to whom such sale is made. Any person, other than a manufacturer of any of the drugs mentioned in section two hundred and forty-five or a wholesale dealer in drugs or a licensed pharmacist, licensed druggist, duly registered practicing physician, licensed veterinarian or a licensed dentist, who shall possess any of the drugs mentioned in section two hundred and forty-five or their salts, derivatives or preparations, shall be guilty of a misdemeanor, unless said possession is authorized by the certificate described in this section. Nothing herein contained shall be construed to prohibit the sale of any of such drugs by any manufacturing pharmacist or chemist or wholesale or retail pharmacists or druggists, or to hospitals, colleges, scientific or public institutions, except that such sales shall be made in the manner provided in the next succeeding section.

247. Order blanks; filing. The state commissioner of health shall prepare and furnish to all Board of Health or officers official order blanks, serially numbered in duplicate, bound in book form, with carbon or transfer paper between the duplicate pages. The said official order shall be furnished by the local health board or officer to any local, duly licensed physician, dentist, pharmacist, druggist or veterinarian, upon which must be written all orders for the purchase of any of the drugs enumerated in section two hundred and forty-five of this chapter for the use of such physician, dentist, pharmacist, druggist or veterinarian. It shall be unlawful for any person to sell, furnish or dispose to any physician, pharmacist, druggist, veterinarian or dentist any of the drugs enumerated in section two hundred and forty-five of this chapter without first receiving from such physician, druggist, veterinarian or dentist an official order blank as provided in this section, which official order shall be retained by the person or corporation who sells, furnishes or dispenses any of the drugs enumerated in section two hundred and forty-five of this chapter, and such official order shall be kept in a separate file or book and an entry made or caused to be made

on the order stating the date of sale, the name and address of the purchaser and the name of the person making such sale.

248. Physicians, et cetera, to keep records. All physicians, druggists, pharmacists, veterinarians and dentists shall keep on record the name and address of each person to whom such physician, dentist or veterinarian administers or disposes in any way whatsoever any of the drugs enumerated in section two hundred and forty-five of this chapter, and the quantity so administered, disposed of or given away. Such record shall be preserved for five years and shall always be open for inspection by the proper authorities. Any violation of this section is hereby declared to be a misdemeanor.

ENTERS THE B. A. I. SERVICE.—Dr. Bernard Johnsen, North Fort Worth, Texas, has entered the government service in the B. A. I.

ENTERS THE FIELD OF GENERAL PRACTICE.—Dr. S. J. Marquardt has located in Barnersville, Ohio, to engage in general practice. The doctor formerly lived at Monroeville, that state.

NATIONAL ASSOCIATION OF B. A. I. EMPLOYEES will meet in Denver, Colorado, August 10, 1914. Specific place of meeting will be announced in the August REVIEW.

WASHINGTON STATE VETERINARY MEDICAL ASSOCIATION.—The above association held a two days' meeting at Walla Walla on June 18-19, at which a nice programme was enacted.

DR. D. ARTHUR HUGHES RETURNS TO CHICAGO.—Under date of June 8, we received a communication from our esteemed collaborator, Dr. D. Arthur Hughes, advising us that he had returned from Fort Worth, Texas, whither he was sent by the Quartermaster's Department of the United States Army.

DR. EVENSON IN FIELD SERVICE IN MINNESOTA.—Dr. Harry Evenson recently returned from the Philippines, where he was in the federal service, is now field veterinarian for the State Live Stock Sanitary Board of Minnesota, with headquarters at Olivia, that state. The Live Stock Board is working in co-operation with the B. A. I., in an effort to control hog cholera.

MINNESOTA STATE VETERINARY MEDICAL ASSOCIATION.—The seventeenth semi-annual meeting of this most excellent association will be held at Northfield July 8-9. Our esteemed friend, the veteran secretary of the association, with his usual activity and earnestness is making preparations for a meeting that no one can afford to absent himself from.

VETERINARY MEDICAL ASSOCIATION MEETINGS.

In the accompanying table the data given is reported by many Secretaries as being of great value to their Associations, and it is to be regretted that some neglect to inform us of the dates and places of their meetings.

Secretaries are earnestly requested to see that their organizations are properly included in the following list :

Name of Organization.	Date of Next Meeting.	Place of Meeting.	Name and Address Secretary.
Alabama Veterinary Med. Ass'n	Mar. 5-6-7, 1914	Auburn	C. A. Cary, Auburn.
Alumni Ass'n, N. Y.-A. V. C.	June 10, 1914	141 W. 54th St.	P. K. Nichols, Port Richmond, N.Y.
American V. M. Ass'n.	Dec., 28-31, 1914	New Orleans, La	Nelsen S. Mayo, 4753 Ravenswood Ave., Chicago, Ill.
Arkansas Veterinary Ass'n.	January 5-6, 1915	Little Rock.	R. M. Gow, Fayetteville.
Ass'n Médécale Veterinare Française. "Laval"	1st and 3d Thur. of each month	Lec. Room, Laval Un'y, Mon.	J. P. A. Houde, Montreal.
B. A. I. Vet. In. A., Chicago	2d Fri. each month.	Chicago	H. A. Smith, Chicago, Ill.
B. A. I. Vet. In. A., So. Omaha.	3d Mon. each month.	S. Omaha, Neb.	E. J. Jackson, So. Omaha.
Buchanan Co. Vet. Ass'n.	Monthly.	St. Joseph	F. W. Caldwell, St. Joseph, Mo.
California State V. M. Ass'n.	December 10, 1913.	San Francisco	John F. McKenna, Fresno.
Central Canada V. Ass'n.	Feb. and July.	Ottawa	A. E. James, Ottawa.
Central N. Y. Vet. Med. Ass'n.	June and Nov.	Syracuse.	W. B. Switzer, Oswego.
Chicago Veterinary Society	2d Tues. each month.	Chicago	D. M. Campbell, Chicago
Colorado State V. M. Ass'n.	May 28-29, 1914	Ft. Collins	I. E. Newsom, Ft. Collins.
Connecticut V. M. Ass'n.	Aug. 4, 1914	Waterbury	B K. Dow, Willimantic.
Delaware State Vet. Society.	Jan , Apl., July. Oct.	Wilmington	A. S. Houchin, Newark, Del.
Essex Co. (N. J.) V. M. A.	3d Mon. each month.	Newark, N. J.	J. F. Carey, East Orange, N. J.
Genesee Valley V. M. Ass'n.	2d week, July, 1913.	Rochester.	J. H. Taylor, Henrietta.
Georgia State V. M. A.	Dec. 22-23, 1913	Atlanta.	P. F. Bahnsen, Americus.
Hamilton Co. (Ohio) V. A.			Louis P. Cook, Cincinnati.
Illmo Vet. Med. Ass'n.	July 17, 1914	E. St. Louis	L. B. Michael, Collinsville, Ill.
Illinois State V. M. Ass'n.	July 15, 1914.	Springfield	L. A. Merillat, Chicago.
Indiana Veterinary Association.	Jan. 14, 1914.	Indianapolis.	A F. Nelson, Indianapolis.
Iowa Veterinary Ass'n.	Pending	Pending	C. H. Stange, Ames.
Kansas State V. M. Ass'n.	Jan. 6-7-8, 1914	Manhattan	J. H. Burt, Manhattan.
Kentucky V. M. Ass'n.	Oct. & Feb.each year	Lexington	Robert Graham, Lexington.
Keystone V. M. Ass'n.	2d Tues. each month.	Philadelphia.	Cheston M. Hoskins.
Lake Erie V. M. Association.	Pending	Pending	Phil. H. Fulstow, Norwalk, Ohio.
Louisiana State V. M. Ass'n.	Sept., 1914	Lake Charles	Hamlet Moore, New Orleans, La
Maine Vet. Med. Ass'n.	July 3, 4, 1914	Houlton	H. B. Wescott, Portland.
Maryland State Vet. Society		Baltimore.	H. H. Counselman, Sec'y.
Massachusetts Vet. Ass'n.	4th Wed. each month.	Young's, Boston.	J. H. Seale, Salem.
Michigan State V. M. Ass'n.	Feb. 3, 4, 1914	Lansing.	W. A. Ewalt, Mt. Clemens.
Minnesota State V. M. Ass'n.	July 8-9, 1914	Northfield	G. Ed. Leech, Winona.
Mississippi State V. M. Ass'n.	1914	Vicksburg	J. D. Townsend, Louisville.
Missouri Valley V. Ass'n.	Jan. 27, 28, 29, 1914	Kansas City,Mo.	Hal. C. Simpson, Denison. Ia.
Mississippi Valley V. M. Ass'n.	Semi-Annually	Galesburg, Ill.	G. E. McIntyre, Alexis, Ill.
Missouri Vet. Med. Ass'n.	July, 1913	Kirksville.	S. Stewart, Kansas City.
Montana State V. M. A.	Sept. 24, 25, 1913.	Helena	A. D. Knowles, Livingston
Nat'l Ass'n B. A. I. Employees.	2d Mon. Aug., 1914.	Denver, Colo.	S. J. Walkley, 185 N. W. Ave., Milwaukee, Wis.
Nebraska V. M. Ass'n.	1st Mo. & Tu.,Dec.'13	Lincoln, Neb.	Carl J. Norden, Nebraska City.
New York S. V. M. Soc'y.	August 11-12-13,1914	Rochester	H. J. Milks, Ithaca, N. Y.
North Carolina V. M. Ass'n.	June 23, 1914	Wilson	J. P. Spoon, Burlington.
North Dakota V. M. Ass'n.	Week of July 20, 1914	Fargo	A. F. Schalk, Agricultural College.
North-Western Ohio V. M. A.	Nov. 1913.	Delphos.	E. V. Hover, Delphos.
Ohio State V. M. Ass'n.	Jan. 14, 15, 1914.	Columbus.	Reuben Hilty, Toledo.
Ohio Soc. of Comparative Med.	Annually	Upper Sandusky.	F. F. Sheets, Van Wert. Ohio.
Ohio Valley Vet. Med. Ass'n.			J. C. Howard, Sullivan.
Oklahoma V. M. Ass'n.	Fall, 1913.	Oklahoma City.	C. E. Steel, Oklahoma City.
Ontario Vet. Ass'n.	1st Week in Feb.1914	Toronto	L. A. Willson, Toronto.
Pennsylvania State V. M. A.	Mar. 3. 4, 1914	Philadelphia	John Reichel, Glenolden.
Philippine V. M. A.	Call of President.	Manila	David C. Kretzer, Manila.
Portland Vet. Med. Ass'n.	4th Tues. each month.	Portland, Ore.	Sam. B. Foster, Portland, Ore
Province of Quebec V. M. A.		Mon. and Que.	Gustave Boyer, Rigaud, P. Q.
Rhode Island V. M. Ass'n.	Jan. and June	Providence.	J. S. Pollard, Providence.
South Carolina Ass'n of Veter'ns.	Pending	Pending	B. K. McInnes. Charleston.
South Illinois V. M. and Surg. Ass'n.	Aug. 4-5-6 1914	Salem	F. Hockman, Iola.
St. Louis Soc. of Vet. Inspectors	1st Wed. fol. the 2d Sun. each month.	St. Louis.	Wm. T. Conway, St. Louis, Mo.
Schuylkill Valley V. M. A.	June 17, 1914	Reading	W. G. Huyett, Wernersville
Soc. Vet. Alumni Univ. Penn.		Philadelphia.	B. T. Woodward, Wash'n, D. C.
South Dakota V. M. A.	Pending	Madison	S. W. Allen. Watertown.
Southern Aux. of Cal. S. V. M. Ass'n.	Jan.. Apl., July, Oct.	Los Angeles	J. A. Dell, Los Angeles.
South St. Joseph Ass'n of Vet. Insp.	4th Tues. each month	407 Illinois Ave.	H. R. Collins, South St. Joseph.
Tennessee Vet. Med. Ass'n.	November. 1914	Nashville	O. L. McMahon, Columbia.
Texas V. M. Ass'n.	Nov., 1913.	College Station.	Allen J. Foster, Marshall
Twin City V. M. Ass'n.	2d Thu. each month.	St. P.-Minneap.	M. H. Reynolds, St. Paul, Minn.
Utah Vet. Med. Ass'n.	Spring of 1914.	Salt Lake City.	E. J. Coburn, Brigham City.
Vermont Vet. Med. Ass'n.			G. T. Stevenson, Burlington.
Veterinary Ass'n of Alberta			C. H. H. Sweetapple, For. Saskatchewan, Alta., Can.
Vet. Ass'n Dist. of Columbia	3d Wed. each month	514 9th St., N.W.	M. Page Smith, Washington, D. C.
Vet. Med. Ass'n, Geo. Wash. Univ.	1st Sat. each month,	Wash'ton, D. C.	J. M. Cashell, 2115 14th Street.
Vet. Ass'n of Manitoba.	Feb. & July each y'r	Winnipeig	Wm. Hilton, Winnipeg.
Vet. Med. Ass'n of N. J.	July 9, 1914	Montclar	E. L. Loblein, New Brunswick.
V. M. Ass'n, New York City	1st Wed. each month.	141 W. 54th St.	R. S. MacKellar, N. Y. City.
Veterinary Practitioners' Club.	Monthly.	Jersey City	T. F. O'Dea Union Hill, N. J.
Virginia State V. M. Ass'n.	July 9-10 1914.	Staunton	Geo. C. Faville, North Emporia.
Washington State Col. V. M. A.	1st & 3d Fri. Eve.	Pullman	R. J. Donohue, Pullman.
Washington State V. M. A.	June 18-19, 1914.	Walla Walla.	Carl Cozier, Bellingham.
Western N. Y. V. M. A.	June 24, 1914.	Buffalo	W.E.Fritz,358 Jefferson St.,Buffalo
Western Penn. V. M. Ass'n.	3d Thu. each month.	Pittsburgh	Benjamin Gunner, Sewickley
Wisconsin Soc. Vet. Grad.	Feb. 10, 11, 1914	Milwaukee	W. W. Arzberger, Watertown
York Co. (Pa.) V. M. A.	June, Sept.,Dec.,Mar	York	E. S. Bausticker, York, Pa

PUBLISHERS' DEPARTMENT.

Subscription price, $3 per annum, invariably in advance; Canadian subscriptions, $3.25; foreign countries, $3.60; students while attending college, $2; Students in Canada, $2.25; single copies, 30 cents in U. S. **Copy for advertisements should be received by 10th of month.**

Rejected manuscripts will not be returned unless postage is forwarded.

Subscribers are earnestly requested to notify the Business Manager immediately upon changing their address. **Make all checks or P. O. orders payable to American Veterinary Review.**

ANTIPHLOGISTINE STILL LEADS against all imitators as a perfect aseptic application in all inflammatory conditions. See lower half of inside back cover page, this issue. Write for booklet and spatula, mentioning the REVIEW.

MAKE IT A ROUTINE PRACTICE to inject *all* horses that you are treating for *foot wounds*, or for any form of wound that by its character may predispose them to an invasion of tetanus bacillus, with 1,500 units of prophylactic antitetanic serum. C. Bischoff & Co., whose announcement appears on page 5 (adv. dept.) of present issue make a special feature of their *Antitetanic Serum*.

CHINOSOL, THE SAFE ANTISEPTIC. In treating wounds on animals two important points have got to be taken into consideration. One of these points is in common with human patients, that is the requirement of an *efficient* antiseptic; the other applies particularly to animals, and more especially to small animals, that are difficult to prevent from licking themselves; and that is that the antiseptic used must be positively non-poisonous. Such a combination of *efficiency* and *non-toxicity* we find in Chinosol. See announcement on the inside back cover page (upper half) and write for sample and full literature, mentioning the REVIEW.